APPENDIX H

NOISE IMPACT ANALYSIS (WITHOUT APPENDICES)

NOISE IMPACT ANALYSIS

HOME DEPOT EAST LONG BEACH

LSA

April 2005

NOISE IMPACT ANALYSIS

HOME DEPOT EAST LONG BEACH

Submitted to:

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LSA Project No. CLB430

LSA

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INTRODUCTION

This noise impact analysis has been prepared to evaluate the potential noise impacts and mitigation measures associated with the Home Depot shopping center project in the City of Long Beach, California (City). This report is intended to satisfy the City's requirement for a project-specific final noise impact analysis by examining the impacts of the proposed project on noise-sensitive uses in the project area and evaluating the mitigation measures incorporated as part of the project design.

PROJECT DESCRIPTION

Project Location

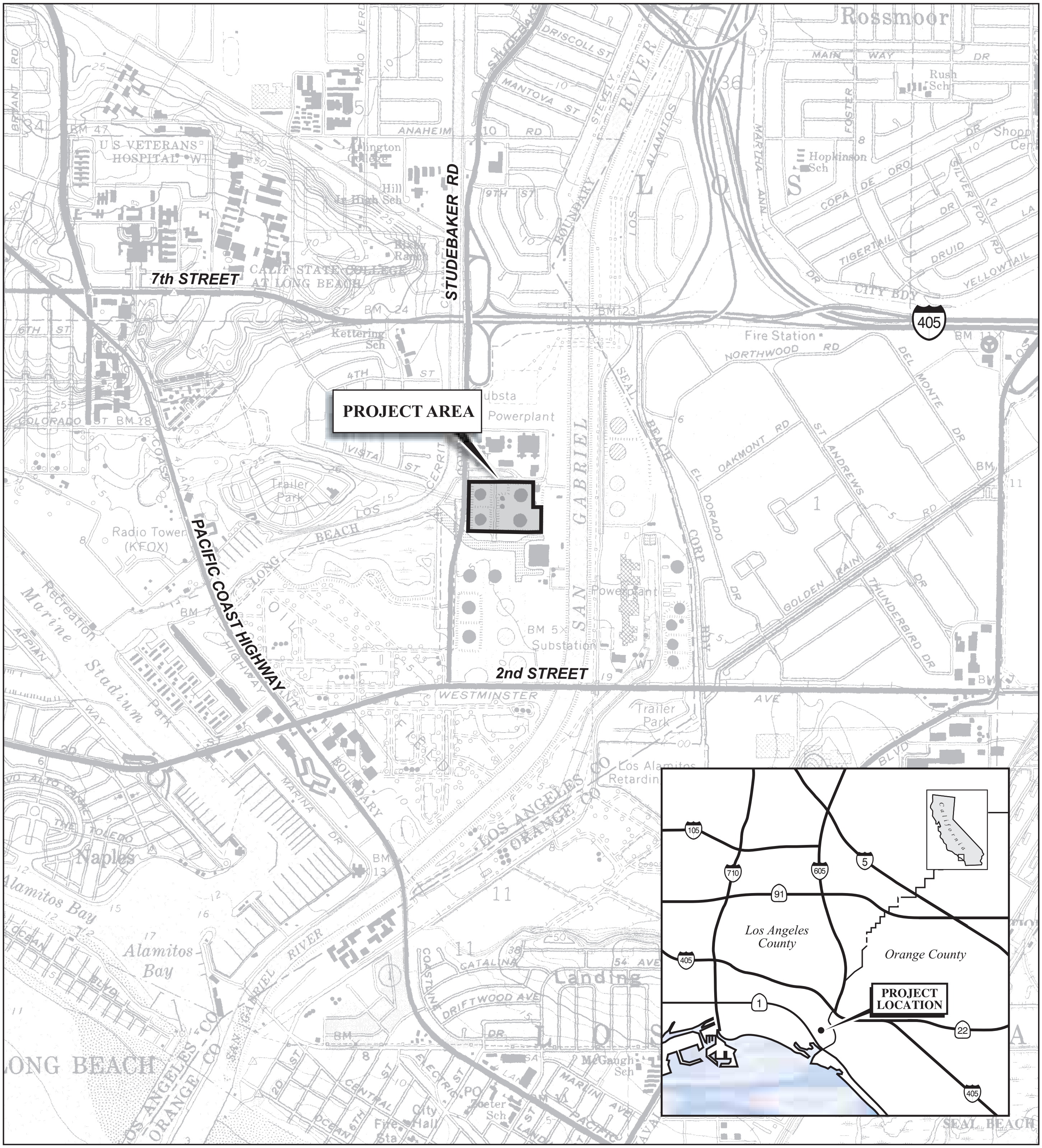
The proposed project site is located in the City of Long Beach. Comprising 16.7 acres, the proposed project site is located at 400 Studebaker Road at the intersection of Studebaker and Loynes Drive. There are supply channels from the Los Cerritos Channel immediately surrounding the project site to the north and south used to provide water for cooling purposes at the power plants. Beyond the supply channels, there are two groups of electric generating plants operated by AES Alamitos LLC, and the Los Angeles Department of Water & Power Haynes Generating Station is located to the southeast across the San Gabriel River. There is also a petroleum storage tank farm operated by Pacific Energy located to the south. Studebaker Road forms the western boundary of the proposed project site. Figure 1 shows the project location.

Project Site Existing Setting

The site has been developed with large storage tanks (built between 1957 and 1962) and pipelines, a former hazardous materials storage area, and a sump area. The prior use includes operation as part of an interconnected terminal and distribution network for various petroleum-based fuels. The storage tanks are no longer used. An existing distribution facility for petroleum is to remain in place along the project's northern boundary. The facility occupies approximately 1.1 acres of the 17.8-acre parcel.

Project Characteristics

The proposed project is a mixed-use retail-commercial development to be anchored by a Home Depot. The project includes 157,529 square feet of commercial space including a 104,886-square-foot home improvement store with a 34,643-square-foot garden center; a 6,000-square-foot sit-down restaurant with an approximately 2,050-square-foot outdoor eating area; and 12,000 square feet of other retail uses. A total of 737 parking spaces are proposed for the development consistent with City of Long Beach Zoning Code requirements. Access to the site will be provided by a new primary entry at the signalized intersection of Studebaker Road and Loynes Drive and by two new secondary entries providing right in/right out access from Studebaker Road. Figure 2 is a site plan for the proposed project.



LSA

FIGURE 1

0 1000 2000
FEET

SOURCE: USGS 7.5' Quads - Seal Beach & Los Alamitos, Ca.

Home Depot East Long Beach

Project Location

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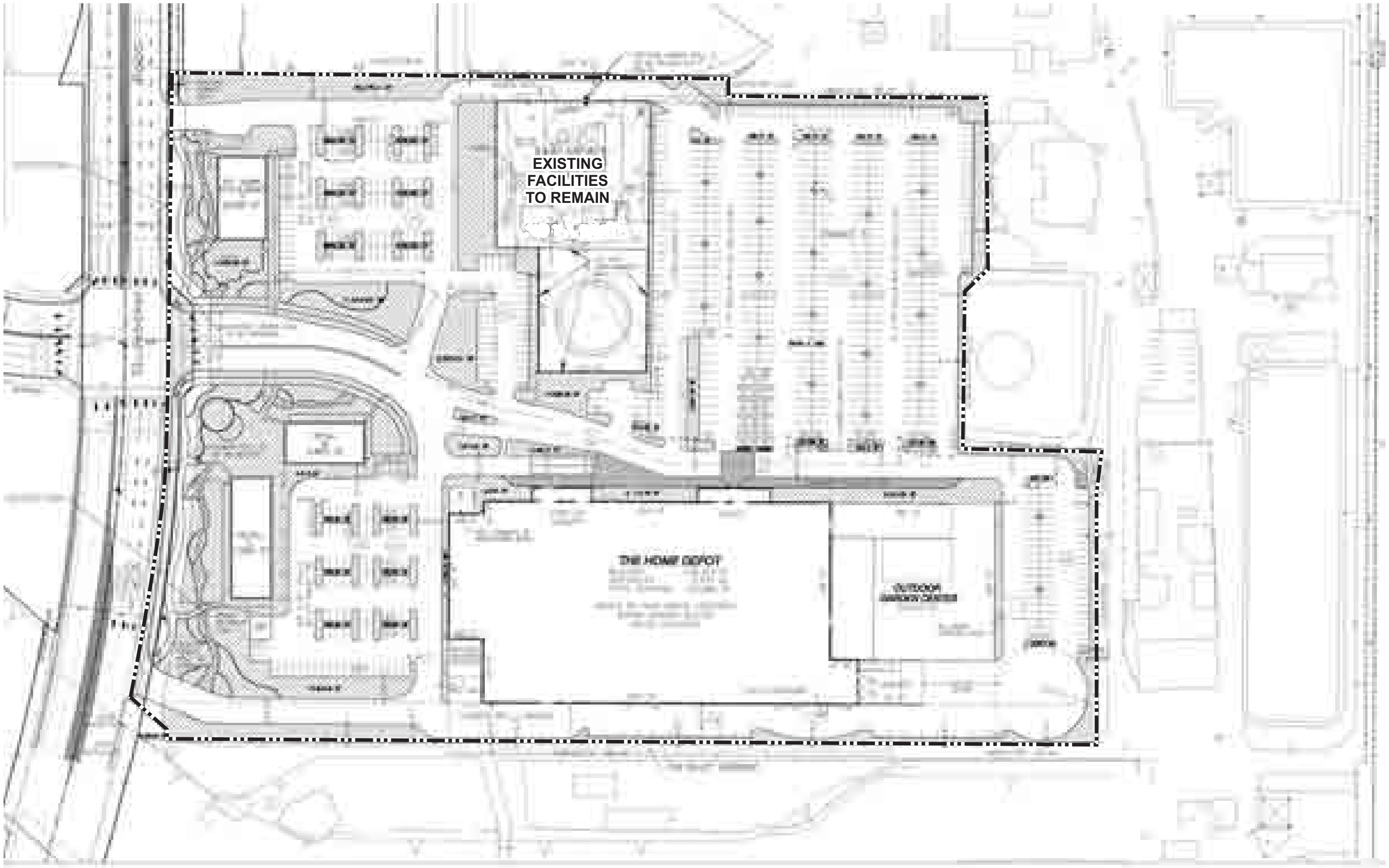

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FIGURE 2

- Project Area

N

0 100 200

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SOURCE: Greenberg Farrow

Home Depot East Long Beach

Site Plan

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METHODOLOGY RELATED TO NOISE IMPACT ASSESSMENT

Evaluation of noise impacts associated with a proposed commercial project typically includes the following:

- Determine the short-term construction noise impacts on off-site noise-sensitive uses
- Determine the long-term noise impacts, including vehicular traffic and aircraft activities, on on-site noise-sensitive uses
- Determine the required mitigation measures to reduce long-term on-site noise impacts from all sources

CHARACTERISTICS OF SOUND

Sound is increasing to such disagreeable levels in our environment that it can threaten our quality of life. Noise is usually defined as unwanted sound. Noise consists of any sound that may produce physiological or psychological damage and/or interfere with communication, work, rest, recreation, and sleep. To the human ear, sound has two significant characteristics: pitch and loudness. Pitch is generally an annoyance, while loudness can affect our ability to hear. Pitch is the number of complete vibrations or cycles per second of a wave that result in the tone's range from high to low. Loudness is the strength of a sound that describes a noisy or quiet environment and is measured by the amplitude of the sound wave. Loudness is determined by the intensity of the sound waves combined with the reception characteristics of the human ear. Sound intensity refers to how hard the sound wave strikes an object, which in turn produces the sound's effect. This characteristic of sound can be precisely measured with instruments. The analysis of a project defines the noise environment of the project area in terms of sound intensity and its effect on adjacent sensitive land uses.

Measurement of Sound

Sound intensity is measured through the A-weighted scale (i.e., dBA) to correct for the relative frequency response of the human ear. That is, an A-weighted noise level de-emphasizes low and very high frequencies of sound similar to the human ear's de-emphasis of these frequencies. Unlike linear units such as inches or pounds, decibels are measured on a logarithmic scale, representing points on a sharply rising curve. For example, 10 decibels are 10 times more intense than 1 decibel, 20 decibels are 100 times more intense, and 30 decibels are 1,000 times more intense. Thirty decibels represent 1,000 times as much acoustic energy as one decibel. A sound as soft as human breathing is about 10 times greater than 0 decibel. The decibel system of measuring sound gives a rough connection between the physical intensity of sound and its perceived loudness to the human ear. A 10-decibel increase in sound level is perceived by the human ear as only a doubling of the loudness of the sound. Ambient sounds generally range from 30 dBA (very quiet) to 100 dBA (very loud).

Sound levels are generated from a source, and their decibel level decreases as the distance from that source increases. Sound dissipates exponentially with distance from the noise source. For a single point source, sound levels decrease approximately six decibels for each doubling of distance from the source. This drop-off rate is appropriate for noise generated by stationary equipment. If noise is produced by a line source such as highway traffic or railroad operations, the sound decreases three decibels for each doubling of distance in a hard site environment. Line source noise in a relatively flat environment with absorptive vegetation decreases four and one-half decibels for each doubling of distance.

There are many ways to rate noise for various time periods, but an appropriate rating of ambient noise affecting humans also accounts for the annoying effects of sound. However, the predominant rating scales for human communities in the State of California are the Equivalent-Continuous sound level (L_{eq}) and Community Noise Equivalent (CNEL) based on A-weighted decibels (dBA). L_{eq} is the total sound energy of time-varying noise over a sample period. CNEL is the time-varying noise over a 24-hour period, with a weighting factor of 5 dBA applied to the hourly L_{eq} for noises occurring from 7:00 p.m. to 10:00 p.m. (defined as relaxation hours) and with a weighting factor of 10 dBA from 10:00 p.m. to 7:00 a.m. (defined as sleeping hours). The noise adjustments are added to the noise events occurring during the more sensitive hours. Day-night average noise (L_{dn}) is similar to the CNEL but without the adjustment for nighttime noise events. CNEL and L_{dn} are normally exchangeable and within 1 dB of each other. Other noise-rating scales of importance when assessing annoyance factor include the maximum noise level, or L_{max}, and percentile noise exceedance levels, or L_N. L_{max} is the highest exponential time-averaged sound level that occurs during a stated time period. It reflects peak operating conditions and addresses the annoying aspects of intermittent noise. L_N is the noise level that is exceeded "N" percent of the time during a specified time period. For example, the L_{10} noise level represents the noise level exceeded 10 percent of the time during a stated period. The L_{50} noise level represents the median noise level. Half the time the noise level exceeds this level and half the time it is less than this level. The L_{90} noise level represents the noise level exceeded 90 percent of the time and is considered the lowest noise level experienced during a monitoring period. It is normally referred to as the background noise level.

Psychological and Physiological Effects of Noise

Physical damage to human hearing begins at prolonged exposure to noise levels higher than 85 dBA. Exposure to high noise levels affects our entire system, with prolonged noise exposure in excess of 75 dBA increasing body tensions and thereby affecting blood pressure, functions of the heart, and the nervous system. In comparison, extended periods of noise exposure above 90 dBA would result in permanent cell damage. When the noise level reaches 120 dBA, a tickling sensation occurs in the human ear even with short-term exposure. This level of noise is called the threshold of feeling. As the sound reaches 140 dBA, the tickling sensation is replaced by the feeling of pain in the ear. This is called the threshold of pain. Dizziness and loss of equilibrium may occur between 160 and 165 dBA. The ambient or background noise problem is widespread and generally more concentrated in urban areas than in outlying less developed areas.

Table A lists "Definitions of Acoustical Terms." Table B shows "Common Sound Levels and Their Sources." Table C shows "Land Use Compatibility for Exterior Community Noise" recommended by the California Department of Health, Office of Noise Control.

Table A: Definitions of Acoustical Terms

Term	Definitions
Decibel, dB	A unit of level that denotes the ratio between two quantities that are proportional to power; the number of decibels is 10 times the logarithm (to the base 10) of this ratio.
Frequency, Hz	Of a function periodic in time, the number of times that the quantity repeats itself in one second (i.e., number of cycles per second).
A-Weighted Sound Level, dBA	The sound level obtained by use of A-weighting. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. All sound levels in this report are A-weighted, unless reported otherwise.
L_{01}, L_{10}, L_{50}, L_{90}	The fast A-weighted noise levels that are equaled or exceeded by a fluctuating sound level 1 percent, 10 percent, 50 percent, and 90 percent of a stated time period.
Equivalent Continuous Noise Level, L_{eq}	The level of a steady sound that, in a stated time period and at a stated location, has the same A-weighted sound energy as the time-varying sound.
Community Noise Equivalent Level, CNEL	The 24-hour A-weighted average sound level from midnight to midnight, obtained after the addition of 5 dBA to sound levels occurring in the evening from 7:00 p.m. to 10:00 p.m. and after the addition of 10 dBA to sound levels occurring in the night between 10:00 p.m. and 7:00 a.m.
Day/Night Noise Level, L_{dn}	The 24-hour A-weighted average sound level from midnight to midnight, obtained after the addition of 10 dBA to sound levels occurring in the night between 10:00 p.m. and 7:00 a.m.
L_{max}, L_{min}	The maximum and minimum A-weighted sound levels measured on a sound level meter, during a designated time interval, using fast time averaging.
Ambient Noise Level	The all encompassing noise associated with a given environment at a specified time, usually a composite of sound from many sources at many directions, near and far; no particular sound is dominant.
Intrusive	The noise that intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.

Source: Handbook of Acoustical Measurements and Noise Control 1991.

Table B: Common Sound Levels and Their Noise Sources

Noise Source	A-Weighted Sound Level in Decibels	Noise Environment	Subjective Evaluation
Near Jet Engine	140	Deafening	128 times as loud
Civil Defense Siren	130	Threshold of Pain	64 times as loud
Hard Rock Band	120	Threshold of Feeling	32 times as loud
Accelerating Motorcycle at a Few Feet Away	110	Very Loud	16 times as loud
Pile Driver; Noisy Urban Street/Heavy City Traffic	100	Very Loud	8 times as loud
Ambulance Siren; Food Blender	95	Very Loud	
Garbage Disposal	90	Very Loud	4 times as loud
Freight Cars; Living Room Music	85	Loud	
Pneumatic Drill; Vacuum Cleaner	80	Loud	2 times as loud
Busy Restaurant	75	Moderately Loud	
Near Freeway Auto Traffic	70	Moderately Loud	Baseline
Average Office	60	Quiet	One-half as loud
Suburban Street	55	Quiet	
Light Traffic; Soft Radio Music in Apartment	50	Quiet	One-quarter as loud
Large Transformer	45	Quiet	
Average Residence without Stereo Playing	40	Faint	One-eighth as loud
Soft Whisper	30	Faint	
Rustling Leaves	20	Very Faint	
Human Breathing	10	Very Faint	Threshold of Hearing
	0	Very Faint	

Source: Compiled by LSA Associates, Inc. 1998.

Table C: Land Use Compatibility for Exterior Community Noise

Land Use Category	Noise Range (Ldn or CNEL), dB			
	I	II	III	IV
Passively-used open spaces	50	50–55	55–70	70+
Auditoriums, concert halls, amphitheaters	45–50	50–65	65–70	70+
Residential: low-density single-family, duplex, mobile homes	50–55	55–70	70–75	75+
Residential: multifamily	50–60	60–70	70–75	75+
Transient lodging: motels, hotels	50–60	60–70	70–80	80+
Schools, libraries, churches, hospitals, nursing homes	50–60	60–70	70–80	80+
Actively used open spaces: playgrounds, neighborhood parks	50–67	—	67–73	73+
Golf courses, riding stables, water recreation, cemeteries	50–70	—	70–80	80+
Office buildings, business commercial and professional	50–67	67–75	75+	—
Industrial, manufacturing, utilities, agriculture	50–70	70–75	75+	—

Noise Range I—Normally Acceptable: Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

Noise Range II—Conditionally Acceptable: New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features are included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning, will normally suffice.

Noise Range III—Normally Unacceptable: New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

Noise Range IV—Clearly Unacceptable: New construction or development should generally not be undertaken.

Source: Office of Noise Control, California Department of Health 1976.

SETTING

Sensitive Land Uses in the Project Vicinity

Certain land uses are considered more sensitive to noise than others. Examples of these include residential areas, educational facilities, hospitals, childcare facilities, and senior housing. The closest off-site sensitive land use to the project site is the residential area to the northwest at a distance of approximately 550 ft from the project boundary.

Overview of the Existing Noise Environment

The primary existing noise sources in the project area are transportation facilities and electrical generation plants. Traffic on Studebaker Road and Loynes Drive is the dominant source contributing to area ambient noise levels at the residences to the west. Noise from motor vehicles is generated by engine vibrations, the interaction between the tires and the road, and the exhaust system. Noise levels on and in the vicinity of the project site will change as a result of the proposed project. Potential noise impacts associated with the project include road noise due to increases in vehicular traffic and construction noise.

Ambient Noise Monitoring in the Project Vicinity

An ambient noise survey was conducted by LSA Associates, Inc. (LSA) in the project vicinity on January 27, 2004. Noise measurements were taken for 10 minutes at each site. Five measurements at representative noise-sensitive locations around the project site were taken to document existing ambient noise levels. See Figure 3 for the locations of the sound monitoring sites.

Table D summarizes the noise measurement data from the five monitoring locations. The nearest residence to Monitoring Location 5 is 6325 Vista Street. As shown, the ambient noise levels range from 65.8 to 70.0 dBA L_{max} on site and is 62.3 dBA L_{max} at Monitoring Location 5. As also shown, the L_{eq} ambient noise level ranges from 56.3 to 64.3 dBA on site and is 55.5 dBA L_{eq} at Monitoring Location 5. The on-site sound levels are primarily from the power stations to the north and south, and to a lesser extent, the traffic on Studebaker Road and other nearby roads.

Existing Traffic Noise

Existing traffic noise levels in the study area are listed in Table E. The FHWA highway traffic noise prediction model (FHWA RD-77-108) was used to evaluate highway traffic-related noise conditions along Studebaker Road, Loynes Drive, Pacific Coast Highway (PCH), Bellflower Boulevard, and Westminster Avenue in the project vicinity. This model requires various parameters, including traffic volumes, vehicle mix, vehicle speed, and roadway geometry to compute typical equivalent noise levels during daytime, evening, and nighttime hours. The existing average daily traffic (ADT) volumes in the area were taken from the *Traffic Impact Analysis* prepared for the project (LSA, December 2004). The resultant noise levels are weighted and summed over 24-hour periods to determine the CNEL values. As shown in Tables E and F, traffic noise along these roadway segments is generally moderate to high. For Loynes Drive and Bixby Village, the 70 dBA CNEL traffic noise contour is confined within the roadway right-of-way.

LSA

FIGURE 3

LEGEND

2 - Sound Monitoring Locations

1. - Oil Storage Tank

N

0 225

FEET

SOURCE: City of Long Beach, Public Works

Home Depot East Long Beach

Noise Monitoring Locations

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Table D: Locations of Ambient Noise Monitoring

	Location	Start Time	L_{max} (dBA)	L_{eq} (dBA)	Noise Sources	Remark
1.	Mid-property near a two-lane vehicle access path between the four tanks	10:46 a.m.	68.1	56.3	Primarily repair activity, northern and southern plant noise, aircraft noise	Noise levels from the northern and southern plants ranged from 53.0 to 54.7 dBA. Plant noise in the southern area is observed to be slightly louder than the northern area.
2.	Southeast of Tank 2 at the south property line	10:58 a.m.	65.8	63.1	Southern plant noise, aircraft noise	Noise levels from the southern plant ranged from 61.0 to 63.6 dBA. Plant noise on the north side was not audible. An eight-ft berm surrounds Tanks 1, 2, 3, and 4.
3.	Southwest of Tank 2 at the southwest corner of the property	11:12 a.m.	69.8	64.3	Primarily traffic on Studebaker Road, southern plant noise, aircraft noise	Approximately 90 feet from the edge of roadway. Plant noise on the north side was not audible. An eight-ft berm surrounds Tanks 1, 2, 3, and 4.
4.	Between Tanks 1 and 3 near the north property line	11:26 a.m.	70.0	61.8	Primarily aircraft noise, north plant noise	Noise levels from the northern plant ranged from 60.8 to 62.4 dBA. Plant noise on the south side was not audible.
5.	University Park Estates (Channel View Park) between the pedestrian walkway and residential property line. Approximately 15 feet in front of residential property line. Nearest resident to the monitoring location is 6325 Vista Street.	11:48 a.m.	62.3	55.5	Traffic noise on Studebaker Road and Loynes Drive, aircraft noise, dog barking, and lawn mower in the background	A five-foot-tall wall is located on the residential property line. The residential community is at a lower elevation than Studebaker Road and Loynes Drive. Faint plant noise was observed. Homes closest to Loynes Drive are approximately four ft below the roadway. Six-foot walls are located on the residential property line.

Source: LSA Associates. Inc. January 27, 2004.

Table E: Existing Weekday Traffic Noise Levels

Roadway Segment	ADT	Center-line to 70 CNEL (feet)	Center-line to 65 CNEL (feet)	Center-line to 60 CNEL (feet)	CNEL (dBA) 50 feet from Outermost Lane
Pacific Coast Highway north of 7th St.	31,800	92	193	413	71.6
Pacific Coast Highway between 7th St. and Bellflower Blvd.	24,300	78	162	345	70.4
Pacific Coast Highway between Bellflower Blvd. and Loynes Dr.	31,400	91	191	409	71.5
Pacific Coast Highway between Loynes Dr. and 2nd St.	36,900	84	178	382	71.5
Pacific Coast Highway between 2nd St. and Studebaker Rd.	37,400	102	215	460	72.3
Pacific Coast Highway south of Studebaker Rd.	39,800	106	224	479	72.5
Studebaker Rd. north of SR-22 WB ramps	27,100	69	145	311	70.1
Studebaker Rd. between SR-22 WB ramps and SR-22 EB ramps	34,700	81	171	367	71.2
Studebaker Rd. between SR-22 EB ramps and AES plant driveway	39,800	88	187	402	71.8
Studebaker Rd. between AES plant driveway and Loynes Dr.	40,100	89	188	404	71.8
Studebaker Rd. between Loynes Dr. and 2nd St.	31,600	76	161	345	70.8
Studebaker Rd. east of Pacific Coast Highway	1,800	< 50[1]	< 50	< 50	56.7
Studebaker Rd. west of Pacific Coast Highway	8,300	< 50	68	142	65.0
Loynes Dr. west of Pacific Coast Highway	8,600	< 50	< 50	96	63.5
Loynes Dr. between Pacific Coast Highway and Bixby Village	10,100	< 50	77	162	65.9
Loynes Dr. between Bixby Village and Studebaker Rd.	10,700	< 50	80	168	66.1
Bixby Village north of Loynes Dr.	2,300	< 50	< 50	< 50	57.8
Bixby Village south of Loynes Dr.	1,400	< 50	< 50	< 50	55.7
SR-22 WB ramps east of Studebaker Rd.	15,600	< 50	101	216	67.7
SR-22 EB ramps east of Studebaker Rd.	16,000	< 50	103	219	67.9
Bellflower Blvd. east of Pacific Coast Highway	16,300	< 50	104	222	67.9
Bellflower Blvd. west of Pacific Coast Highway	9,300	< 50	73	153	65.5
7th St. west of Pacific Coast Highway	46,300	97	207	444	72.5
7th St. east of Pacific Coast Highway	53,100	106	227	487	73.1
AES plant driveway east of Studebaker Rd.	300	< 50	< 50	< 50	49.0

Source: LSA Associates, Inc., January 2005.

1 Traffic noise within 50 feet of roadway centerline requires site-specific analysis.

Table F: Existing Weekend Traffic Noise Levels

Roadway Segment	ADT	Center-line to 70 CNEL (feet)	Center-line to 65 CNEL (feet)	Center-line to 60 CNEL (feet)	CNEL (dBA) 50 feet from Outermost Lane
Pacific Coast Highway north of 7th St.	26,100	82	169	362	70.7
Pacific Coast Highway between 7th St. and Bellflower Blvd.	20,800	71	146	312	69.7
Pacific Coast Highway between Bellflower Blvd. and Loynes Dr.	26,900	83	173	370	70.8
Pacific Coast Highway between Loynes Dr. and 2nd St.	30,600	75	157	337	70.7
Pacific Coast Highway between 2nd St. and Studebaker Rd.	34,200	96	202	433	71.9
Pacific Coast Highway south of Studebaker Rd.	36,700	101	212	454	72.2
Studebaker Rd. north of SR-22 WB ramps	12,300	< 50[1]	87	184	66.7
Studebaker Rd. between SR-22 WB ramps and SR-22 EB ramps	20,900	59	123	262	69.0
Studebaker Rd. between SR-22 EB ramps and AES plant driveway	30,100	74	156	334	70.6
Studebaker Rd. between AES plant driveway and Loynes Dr.	30,500	75	157	337	70.7
Studebaker Rd. between Loynes Dr. and 2nd St.	28,500	72	150	322	70.4
Studebaker Rd. east of Pacific Coast Highway	2,000	< 50	< 50	< 50	57.2
Studebaker Rd. west of Pacific Coast Highway	7,300	< 50	63	131	64.4
Loynes Dr. west of Pacific Coast Highway	5,800	< 50	< 50	74	61.8
Loynes Dr. between Pacific Coast Highway and Bixby Village	6,800	< 50	60	125	64.1
Loynes Dr. between Bixby Village and Studebaker Rd.	5,800	< 50	55	113	63.4
Bixby Village north of Loynes Dr.	1,800	< 50	< 50	< 50	56.7
Bixby Village south of Loynes Dr.	1,100	< 50	< 50	< 50	54.6
SR-22 WB ramps east of Studebaker Rd.	9,800	< 50	75	159	65.7
SR-22 EB ramps east of Studebaker Rd.	12,500	< 50	88	186	66.8
Bellflower Blvd. east of Pacific Coast Highway	14,400	< 50	96	205	67.4
Bellflower Blvd. west of Pacific Coast Highway	7,000	< 50	61	127	64.3
7th St. west of Pacific Coast Highway	30,400	75	157	336	70.6
7th St. east of Pacific Coast Highway	36,100	83	176	377	71.4
AES plant driveway east of Studebaker Rd.	100	< 50	< 50	< 50	44.2

Source: LSA Associates, Inc., January 2005.

1 Traffic noise within 50 feet of roadway centerline requires site-specific analysis.

THRESHOLDS OF SIGNIFICANCE

A project will normally have a significant effect on the environment related to noise if it will substantially increase the ambient noise levels for adjoining areas or conflict with adopted environmental plans and goals of the community in which it is located. The applicable noise standards governing the project site are the criteria in the City's Noise Element of the General Plan and Municipal Code.

City of Long Beach Noise Standards

Noise Element of the General Plan. The Noise Element of the General Plan contains noise standards for mobile noise sources. These standards address the impacts of noise from adjacent roadways and airports. The City specifies outdoor and indoor noise limits for residential uses, places of worship, educational facilities, hospitals, hotels/motels, and commercial and other land uses. The noise standard for exterior living areas is 65 dBA CNEL. The indoor noise standard is 45 dBA CNEL, which is consistent with the standard in the California Noise Insulation Standard.

Municipal Code. The City has adopted a quantitative Noise Control Ordinance, No. C-5371, Long Beach 1978 (Municipal Code, Chapter 8.80). The ordinance establishes maximum permissible hourly noise levels (L_{50}) for different districts throughout the City. Tables G and H list exterior noise and interior noise limits for various land uses.

Table G: Exterior Noise Limits, L_N (dBA)

Receiving Land Use	Time Period	L_{50}	L_{25}	L_8	L_2	L_{max}
Residential (District One)	Night: 10:00 p.m.–7:00 a.m.	45	50	55	60	65
	Day: 7:00 a.m.–10:00 p.m.	50	55	60	65	70
Commercial (District Two)	Night: 10:00 p.m.–7:00 a.m.	55	60	65	70	75
	Day: 7:00 a.m.–10:00 p.m.	60	65	70	75	80
Industrial (District Three)	Anytime*	65	70	75	80	85

* For use at boundaries rather than for noise control within industrial districts.

Table H: Maximum Interior Sound Levels, L_N (dBA)

Receiving Land Use	Time Interval	L_8	L_2	L_{max}
Residential	10:00 p.m.–7:00 a.m.	35	40	45
	7:00 a.m.–10:00 p.m.	45	50	55
School	7:00 a.m.–10:00 p.m. (while school is in session)	45	50	55
Hospital and other noise-sensitive zones	Anytime	40	45	50

The City's Noise Control Ordinance also governs the time of day that construction work can be performed. The Noise Ordinance prohibits construction, drilling, repair, alteration, or demolition work between the hours of 10:00 p.m. and 7:00 a.m. on weekdays or at any time on weekends or federal holidays if the noise would create a disturbance across a residential or commercial property line or violate the quantitative provisions of the ordinance.

IMPACTS AND MITIGATION MEASURES

Implementation of the proposed project would result in short-term construction and long-term traffic and stationary noise impacts. Once the project has been completed, the noise generated by on-site activities has the potential to affect neighboring sensitive uses. The following discussion focuses on the increase in noise associated with the construction and operation of the proposed project including increased noise from project traffic and the traffic in the project area.

Less Than Significant Impacts

Off-Site Traffic Impact. Tables I, J, K, and L list future noise levels along Studebaker Road, Loynes Drive, and other roadways in the project vicinity occurring during the year 2006 baseline and with project scenarios. These noise levels represent the worst-case scenario, which assumes that no shielding is provided between the traffic and the location where the noise contours are drawn. The specific assumptions used in developing these noise levels and the model printouts are provided in Appendix A.

These tables show the traffic noise levels for 2006 with and without the project. Traffic noise levels would continue to be moderate to high. The data in Tables J and L shows that there is very little change in the traffic noise levels associated with the implementation of the project; all areas would increase less than 1.0 dBA. The largest increase in traffic noise level is along Loynes Drive between Bixby Village and Studebaker Road, where an increase of approximately 1.8 dBA is predicted. As changes in noise level of three dBA or less are not perceptible to the human ear in an outdoor environment, these noise level increases would be considered less than significant. No mitigation measures are required.

Airport Noise Impact. The Long Beach Municipal Airport is located approximately three and one-half miles northwest of the project site. Based on the aircraft noise contours produced by the airport, the project site does not lie within the 60 dBA CNEL contour of the airport. Therefore, the potential for a significant impact from airport-related activities is small, and a single-event noise impact analysis is not warranted for this site. The Los Alamitos Reserve Air Station is located approximately two miles northeast of the site. This airport does not publish a noise contour; however, due to this airport’s limited use, the potential for a significant impact from airport-related activities is small, and a single-event noise impact analysis is not warranted for this site.

On-Site Stationary Sources Noise Impact. The proposed project includes a 104,886-square-foot home improvement warehouse and a 34,643-square-foot garden center, for a total building size of 139,529 square feet and three freestanding retail buildings totaling 18,000 square feet. The home improvement and garden center building would be located on the southern portion of the property and would face north parallel to Studebaker Road. The proposed garden center would consist of a combination screened fence/wall enclosure on the east side of the structure. A loading area consisting

Table I: 2006 Weekday Baseline Traffic Noise Levels

Roadway Segment	ADT	Center-line to 70 CNEL (feet)	Center-line to 65 CNEL (feet)	Center-line to 60 CNEL (feet)	CNEL (dBA) 50 feet from Outermost Lane
Pacific Coast Highway north of 7th St.	34,200	96	202	433	71.9
Pacific Coast Highway between 7th St. and Bellflower Blvd.	27,500	84	175	375	70.9
Pacific Coast Highway between Bellflower Blvd. and Loynes Dr.	35,400	98	207	443	72.0
Pacific Coast Highway between Loynes Dr. and 2nd St.	41,200	90	192	411	72.0
Pacific Coast Highway between 2nd St. and Studebaker Rd.	43,300	112	236	507	72.9
Pacific Coast Highway south of Studebaker Rd.	41,700	109	231	494	72.7
Studebaker Rd. north of SR-22 WB ramps	28,800	72	151	324	70.4
Studebaker Rd. between SR-22 WB ramps and SR-22 EB ramps	37,200	85	179	384	71.5
Studebaker Rd. between SR-22 EB ramps and AES plant driveway	44,100	94	200	430	72.3
Studebaker Rd. between AES plant driveway and Loynes Dr.	44,300	95	201	432	72.3
Studebaker Rd. between Loynes Dr. and 2nd St.	35,600	82	174	373	71.3
Studebaker Rd. east of Pacific Coast Highway	6,300	< 50[1]	< 50	78	62.2
Studebaker Rd. west of Pacific Coast Highway	8,600	< 50	70	146	65.2
Loynes Dr. west of Pacific Coast Highway	8,900	< 50	< 50	98	63.7
Loynes Dr. between Pacific Coast Highway and Bixby Village	10,500	< 50	79	166	66.0
Loynes Dr. between Bixby Village and Studebaker Rd.	11,000	< 50	81	171	66.2
Bixby Village north of Loynes Dr.	2,500	< 50	< 50	< 50	58.2
Bixby Village south of Loynes Dr.	1,500	< 50	< 50	< 50	56.0
SR-22 WB ramps east of Studebaker Rd.	16,700	< 50	106	226	68.0
SR-22 EB ramps east of Studebaker Rd.	18,100	54	112	238	68.4
Bellflower Blvd. east of Pacific Coast Highway	17,400	< 50	109	232	68.2
Bellflower Blvd. west of Pacific Coast Highway	9,600	< 50	74	157	65.6
7th St. west of Pacific Coast Highway	48,400	100	213	458	72.7
7th St. east of Pacific Coast Highway	54,500	108	231	495	73.2
AES plant driveway east of Studebaker Rd.	300	< 50	< 50	< 50	49.0

Source: LSA Associates, Inc., January 2005.

1 Traffic noise within 50 feet of roadway centerline requires site-specific analysis.

Table J: 2006 Weekend Baseline Traffic Noise Levels

Roadway Segment	ADT	Center-line to 70 CNEL (feet)	Center-line to 65 CNEL (feet)	Center-line to 60 CNEL (feet)	CNEL (dBA) 50 feet from Outermost Lane
Pacific Coast Highway north of 7th St.	28,000	85	177	379	71.0
Pacific Coast Highway between 7th St. and Bellflower Blvd.	23,500	76	158	338	70.2
Pacific Coast Highway between Bellflower Blvd. and Loynes Dr.	30,700	90	188	403	71.4
Pacific Coast Highway between Loynes Dr. and 2nd St.	34,800	81	171	368	71.2
Pacific Coast Highway between 2nd St. and Studebaker Rd.	42,000	110	232	497	72.8
Pacific Coast Highway south of Studebaker Rd.	39,000	105	221	473	72.4
Studebaker Rd. north of SR-22 WB ramps	13,900	< 50[1]	94	200	67.2
Studebaker Rd. between SR-22 WB ramps and SR-22 EB ramps	23,700	64	133	285	69.6
Studebaker Rd. between SR-22 EB ramps and AES plant driveway	33,900	80	168	361	71.1
Studebaker Rd. between AES plant driveway and Loynes Dr.	34,400	81	170	365	71.2
Studebaker Rd. between Loynes Dr. and 2nd St.	32,300	77	163	350	70.9
Studebaker Rd. east of Pacific Coast Highway	8,300	< 50	< 50	94	63.4
Studebaker Rd. west of Pacific Coast Highway	7,500	< 50	64	133	64.6
Loynes Dr. west of Pacific Coast Highway	6,100	< 50	< 50	76	62.0
Loynes Dr. between Pacific Coast Highway and Bixby Village	7,200	< 50	62	130	64.4
Loynes Dr. between Bixby Village and Studebaker Rd.	5,900	< 50	55	114	63.5
Bixby Village north of Loynes Dr.	2,000	< 50	< 50	< 50	57.2
Bixby Village south of Loynes Dr.	1,100	< 50	< 50	< 50	54.6
SR-22 WB ramps east of Studebaker Rd.	11,100	< 50	82	172	66.3
SR-22 EB ramps east of Studebaker Rd.	13,700	< 50	93	198	67.2
Bellflower Blvd. east of Pacific Coast Highway	15,700	< 50	102	217	67.8
Bellflower Blvd. west of Pacific Coast Highway	7,200	< 50	62	130	64.4
7th St. west of Pacific Coast Highway	32,000	77	162	348	70.9
7th St. east of Pacific Coast Highway	37,000	84	178	383	71.5
AES plant driveway east of Studebaker Rd.	100	< 50	< 50	< 50	44.2

Source: LSA Associates, Inc., January 2005.

[1] Traffic noise within 50 feet of roadway centerline requires site-specific analysis.

Table K: 2006 Weekday With Project Traffic Noise Levels

Roadway Segment	ADT	Center-line to 70 CNEL (feet)	Center-line to 65 CNEL (feet)	Center-line to 60 CNEL (feet)	CNEL (dBA) 50 feet from Outermost Lane	Increase CNEL (dBA) 50 feet from Outermost Lane
Pacific Coast Highway north of 7th St.	34,600	97	204	437	71.9	0.1
Pacific Coast Highway between 7th St. and Bellflower Blvd.	28,100	85	178	380	71.0	0.1
Pacific Coast Highway between Bellflower Blvd. and Loynes Dr.	36,500	100	211	453	72.2	0.1
Pacific Coast Highway between Loynes Dr. and 2nd St.	41,200	90	192	411	72.0	0.0
Pacific Coast Highway between 2nd St. and Studebaker Rd.	43,500	112	237	509	72.9	0.0
Pacific Coast Highway south of Studebaker Rd.	42,000	110	232	497	72.8	0.0
Studebaker Rd. north of SR-22 WB ramps	29,600	73	154	330	70.5	0.1
Studebaker Rd. between SR-22 WB ramps and SR-22 EB ramps	38,600	87	184	394	71.7	0.2
Studebaker Rd. between SR-22 EB ramps and AES plant driveway	45,900	97	206	442	72.4	0.2
Studebaker Rd. between AES plant driveway and Loynes Dr.	45,800	97	205	441	72.4	0.1
Studebaker Rd. between Loynes Dr. and 2nd St.	36,300	83	176	378	71.4	0.1
Studebaker Rd. east of Pacific Coast Highway	6,300	< 50[1]	< 50	78	62.2	0.0
Studebaker Rd. west of Pacific Coast Highway	8,600	< 50	70	146	65.2	0.0
Loynes Dr. west of Pacific Coast Highway	9,000	< 50	< 50	99	63.7	0.0
Loynes Dr. between Pacific Coast Highway and Bixby Village	11,700	< 50	84	178	66.5	0.5
Loynes Dr. between Bixby Village and Studebaker Rd.	12,100	< 50	86	182	66.6	0.4
Bixby Village north of Loynes Dr.	2,600	< 50	< 50	< 50	58.3	0.2
Bixby Village south of Loynes Dr.	1,500	< 50	< 50	< 50	56.0	0.0
SR-22 WB ramps east of Studebaker Rd.	17,200	< 50	108	230	68.2	0.1
SR-22 EB ramps east of Studebaker Rd.	18,600	55	114	242	68.5	0.1
Bellflower Blvd. east of Pacific Coast Highway	17,900	54	111	236	68.3	0.1
Bellflower Blvd. west of Pacific Coast Highway	9,600	< 50	74	157	65.6	0.0
7th St. west of Pacific Coast Highway	48,800	101	214	460	72.7	0.0
7th St. east of Pacific Coast Highway	54,700	108	231	497	73.2	0.0
AES plant driveway east of Studebaker Rd.	300	< 50	< 50	< 50	49.0	0.0

Source: LSA Associates, Inc., January 2005.

[1] Traffic noise within 50 feet of roadway centerline requires site-specific analysis.

Table L: 2006 Weekend With Project Traffic Noise Levels

Roadway Segment	ADT	Center-line to 70 CNEL (feet)	Center-line to 65 CNEL (feet)	Center-line to 60 CNEL (feet)	CNEL (dBA) 50 feet from Outermost Lane	Increase CNEL (dBA) 50 feet from Outermost Lane
Pacific Coast Highway north of 7th St.	28,900	87	181	388	71.1	0.1
Pacific Coast Highway between 7th St. and Bellflower Blvd.	24,900	79	164	351	70.5	0.3
Pacific Coast Highway between Bellflower Blvd. and Loynes Dr.	33,200	95	198	425	71.7	0.3
Pacific Coast Highway between Loynes Dr. and 2nd St.	34,800	81	171	368	71.2	0.0
Pacific Coast Highway between 2nd St. and Studebaker Rd.	42,500	110	233	501	72.8	0.1
Pacific Coast Highway south of Studebaker Rd.	39,500	105	222	477	72.5	0.1
Studebaker Rd. north of SR-22 WB ramps	15,800	< 50[1]	102	218	67.8	0.6
Studebaker Rd. between SR-22 WB ramps and SR-22 EB ramps	26,700	69	144	308	70.1	0.5
Studebaker Rd. between SR-22 EB ramps and AES plant driveway	38,100	86	182	390	71.6	0.5
Studebaker Rd. between AES plant driveway and Loynes Dr.	38,100	86	182	390	71.6	0.4
Studebaker Rd. between Loynes Dr. and 2nd St.	34,400	81	170	365	71.2	0.3
Studebaker Rd. east of Pacific Coast Highway	8,300	< 50	< 50	94	63.4	0.0
Studebaker Rd. west of Pacific Coast Highway	7,500	< 50	64	133	64.6	0.0
Loynes Dr. west of Pacific Coast Highway	6,300	< 50	< 50	78	62.2	0.1
Loynes Dr. between Pacific Coast Highway and Bixby Village	9,900	< 50	76	160	65.8	1.4
Loynes Dr. between Bixby Village and Studebaker Rd.	8,900	< 50	71	149	65.3	1.8
Bixby Village north of Loynes Dr.	2,300	< 50	< 50	< 50	57.8	0.6
Bixby Village south of Loynes Dr.	1,100	< 50	< 50	< 50	54.6	0.0
SR-22 WB ramps east of Studebaker Rd.	12,200	< 50	87	183	66.7	0.4
SR-22 EB ramps east of Studebaker Rd.	14,800	< 50	98	208	67.5	0.3
Bellflower Blvd. east of Pacific Coast Highway	16,800	< 50	106	227	68.1	0.3
Bellflower Blvd. west of Pacific Coast Highway	7,200	< 50	62	130	64.4	0.0
7th St. west of Pacific Coast Highway	33,000	78	165	355	71.0	0.1
7th St. east of Pacific Coast Highway	37,500	85	180	386	71.6	0.1
AES plant driveway east of Studebaker Rd.	100	< 50	< 50	< 50	44.2	0.0

Source: LSA Associates, Inc., January 2005.

1 Traffic noise within 50 feet of roadway centerline requires site-specific analysis.

of four roll-up doors and an elevated loading dock would be located in the rear of the building facing east. A four-foot-high wing wall would extend approximately 75 feet east from the building to screen the loading area.

The on-site noise-generating activities include the loading/unloading activities in the loading area at the rear of the home improvement warehouse. The closest distance between the proposed elevated loading dock to the residences west of Studebaker Road is approximately 1,750 feet. Based on noise readings from loading and unloading activities for similar projects, a noise level of 75 dBA L_{max} at 50 feet was used in this analysis. The noise attenuation of loading/unloading activities, provided by distance divergence at 1,750 feet, is approximately 31 dBA compared to the level at 50 feet. In addition, the loading area is blocked by the main structure of the warehouse, which would provide a minimum of 10 dBA in noise attenuation for areas to the west. Therefore, residences to the west of the project site would be exposed to loading/unloading noise levels of up to 34 dBA L_{max}. This noise level is expected to be lower than traffic noise on Studebaker Road and lower than the nighttime L_{max} of 50 dBA (10 p.m. to 7 a.m.) established by the City. Therefore, no mitigation is required for on-site loading/unloading activities at the home improvement warehouse. Similarly, the proposed garden center would be located at least 1,600 feet from the nearest residences. This distance provides approximately 30 dBA in noise attenuation. Activities within the garden center, such as movement of goods with forklifts, would generate noise levels of up to 70 dBA L_{max}. With the noise attenuation provided by distance divergence, the noise levels from the garden center will be reduced to 40 dBA L_{max} at the nearest residences to the west. Therefore, no mitigation is required for the activities within the garden center.

The proposed commercial retail buildings along Studebaker Road near Loynes Drive would consist of Retail Tenant building pads of approximately 4,800 square feet and approximately 7,200 square feet, and a sit-down restaurant pad of approximately 6,000 square feet with an approximately 2,050-square-foot outdoor eating area. Potential commercial uses that could be developed on the pads include specialty retail or other uses conditionally permitted in Subarea 19 of the PD-1 zoning district. These commercial retail buildings would be located along the western side of the site. The on-site noise-generating activities include loading/unloading activities in a loading area on the north side of the Retail Tenant building pad. The closest distance between the loading area to the residences west of Studebaker Road is approximately 600 feet. The noise attenuation of loading/unloading activities, provided by distance divergence at 600 feet, is approximately 22 dBA compared to the level at 50 feet. Therefore, residences to the west of the project site would be exposed to loading/unloading noise levels of up to 53 dBA L_{max}. This noise level is expected to be lower than traffic noise on Studebaker Road and well below the nighttime L_{max} of 65 dBA (10 p.m. to 7 a.m.) established by the City. Therefore, no mitigation is required for on-site loading/unloading activities.

Parking would generally be located throughout the site, consisting of a paved lot with driveway access to Studebaker Road to the west. Noise associated with activities in the parking lot, such as door slamming, slow-moving vehicles, and customers conversing, would generate intermittent maximum noise levels of approximately 60 dBA L_{max} at 50 feet. The project's front parking area adjacent to Studebaker Road is more than 600 feet from the nearest residences to the west. This distance provides approximately 22 dBA noise reduction. Therefore, noise associated with parking lot activities would be reduced to 38 dBA L_{max} at the nearest residences to the west. This level of noise is much lower than that of the traffic on area roads or the loading/unloading activities discussed above. Therefore, it is not anticipated that noise associated with the parking lot activities will have any significant impact on off-site residences to the west of the project site.

Other proposed site improvements include construction of trash and palette enclosures, retaining walls, security lighting, and landscaping. Trash, palette, and propane enclosures are proposed in the rear of the Home Depot building. Noise associated with these activities would not be any greater than noise levels associated with loading/unloading activities and thus would not affect any off-site uses. No mitigation measures are required for these activities.

Significant Impacts and Mitigation Measures

On-Site Traffic Impact. The only on-site sensitive outdoor area planned for the proposed project would be an outdoor eating area associated with a restaurant that may be built on Pad B. Based on the project's site plan (Figure 2), this outdoor eating area would be approximately 200 feet from the centerline of Studebaker Road. This is within the 65 CNEL noise contour from traffic along Studebaker Road. Therefore, a sound wall would be required, such as a six-foot-tall concrete block/Plexiglas wall, which would reduce the noise impact by 5 dBA to a level that is less than significant.

Construction Activities. Short-term noise impacts would be associated with excavation, grading, and the erection of buildings on site during construction of the proposed project. Construction-related short-term noise levels would be higher than existing ambient noise levels in the project area at the present time, but would no longer occur once construction of the project is completed.

Two types of short-term noise impacts could occur during construction of the proposed project. First, construction crew commutes and the transport of construction equipment and materials to the site for the proposed project would incrementally increase noise levels on access roads leading to the site. A relatively high single-event noise exposure potential will exist at a maximum level of 87 dBA L_{max} with trucks passing at 50 feet. However, the projected construction traffic will be minimal when compared to the existing traffic volumes on Studebaker Road and other affected streets, and its associated long-term noise level change will not be perceptible. Therefore, short-term construction-related worker commutes and equipment transport noise impacts would not be substantial.

The second type of short-term noise impact is related to noise generated during excavation, grading, and construction on the project site. Construction is performed in discrete steps, each of which has its own mix of equipment, and consequently its own noise characteristics. These various sequential phases would change the character of the noise generated on site. Therefore, the noise levels vary as construction progresses. Despite the variety in the type and size of construction equipment, similarities in the dominant noise sources and patterns of operation allow construction-related noise ranges to be categorized by work phase. Table M lists maximum noise levels recommended for noise impact assessments for typical construction equipment based on a distance of 50 feet between the equipment and a noise receptor. Typical maximum noise levels range up to 91 dBA at 50 feet during the noisiest construction phases. The site preparation phase, which includes excavation and grading of the site, tends to generate the highest noise levels, because the noisiest construction equipment is earthmoving equipment. Earthmoving equipment includes excavating machinery such as backfillers, bulldozers, draglines, and front loaders. Earthmoving and compacting equipment includes compactors, scrapers, and graders. Typical operating cycles for these types of construction equipment may involve one or two minutes of full power operation followed by three or four minutes at lower power settings.

Table M: Typical Maximum Construction Equipment Noise Levels (L_{max})

Type of Equipment	Range of Maximum Sound Levels Measured (dBA at 50 feet)	Suggested Maximum Sound Levels for Analysis (dBA at 50 feet)
Pile Drivers, 12,000 to 18,000 ft-lb/blow	81 to 96	93
Rock Drills	83 to 99	96
Jack hammers	75 to 85	82
Pneumatic Tools	78 to 88	85
Pumps	74 to 84	80
Dozers	77 to 90	85
Scrapers	83 to 91	87
Haul Trucks	83 to 94	88
Cranes	79 to 86	82
Portable Generators	71 to 87	80
Rollers	75 to 82	80
Tractors	77 to 82	80
Front-End Loaders	77 to 90	86
Hydraulic Backhoe	81 to 90	86
Hydraulic Excavators	81 to 90	86
Graders	79 to 89	86
Air Compressors	76 to 89	86
Trucks	81 to 87	86

Source: Noise Control for Buildings and Manufacturing Plants, Bolt, Beranek & Newman 1987.

Construction of the proposed project is expected to require the use of earthmovers, bulldozers, water trucks, and pickup trucks. This equipment would be used on the project site. Based on Table M, the maximum noise level generated by each earthmover on the proposed project site is assumed to be 88 dBA L_{max} at 50 feet from the earthmover. Each bulldozer would also generate 88 dBA L_{max} at 50 feet. The maximum noise level generated by water and pickup trucks is approximately 86 dBA L_{max} at 50 feet from these vehicles. Each doubling of a sound source with equal strength increases the noise level by 3 dBA. Assuming that each piece of construction equipment operates at some distance from the other equipment, the worst-case combined noise level at each individual residence during this phase of construction would be 91 dBA L_{max} at a distance of 50 feet from the active construction area. The main construction activities for the Home Depot building would be concentrated at 800 feet from the nearest residences and would have 24 dBA reduction in the maximum construction noise. Maximum construction noise levels reaching these residences from main construction activities would range from 64 to 67 dBA L_{max}. Construction activity noise generated between 7:00 a.m. and 7:00 p.m. Monday through Friday and between 9:00 a.m. and 6:00 p.m. on Saturday is exempt from the Noise Control Ordinance standards. Therefore, if construction is limited to the hours specified, noise generated during construction will not result in a significant impact.

Mitigation Measures

On-Site Traffic Noise. No mitigation measures are required, unless an outdoor eating area is built that is associated with a restaurant on Pad B. A sound wall would be required, such as a six-foot-tall concrete block/Plexiglas wall, between the eating area and Studebaker Road. After mitigation, the noise impact would be less than significant.

Construction Noise. Construction will be limited to the hours of 7:00 a.m. to 7:00 p.m. Monday through Friday and on federal holidays and 9:00 a.m. to 6:00 p.m. on Saturday. In accordance with City standards, no construction activities are permitted outside of these hours and no construction is permitted on Sundays without a special work permit.

The following measures can be implemented to reduce potential construction noise impacts on nearby sensitive receptors:

1. During all site excavation and grading, the project contractors shall equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers consistent with manufacturers' standards.
2. The project contractor shall place all stationary construction equipment so that emitted noise is directed away from sensitive receptors nearest the project site.
3. The construction contractor shall locate equipment staging in areas that will create the greatest distance between construction-related noise sources and noise-sensitive receptors nearest the project site during all project construction.

Level of Significance after Mitigation

No significant noise impacts from short-term construction or long-term operation of the project site will result after implementation of the mitigation measures listed above.

CUMULATIVE IMPACTS

Construction and on-site operations are point sources of noise and would not contribute to off-site cumulative noise impacts from other planned and future projects. Project-related traffic would contribute to cumulative traffic noise impacts in the vicinity of the project site, but sound levels will not increase by more than 3 dBA from their corresponding existing levels. This would be considered an insignificant impact.

REFERENCES

Bolt, Beranek & Newman. 1987. Noise Control for Buildings and Manufacturing Plants.

City of Long Beach. 1975. Noise Element of the General Plan.

City of Long Beach. 1988. Municipal Code.

Federal Highway Administration. 1977. Highway Traffic Noise Prediction Model, FHWA RD-77-108.

LSA Associates, Inc. Traffic Report, December 2004.

U.S. EPA. 1978. Protective Noise Levels: Condensed Version of EPA Levels Document.

APPENDIX A

FHWA TRAFFIC NOISE MODEL PRINTOUTS

Available for review at the City of Long Beach, Department of Planning and Building

APPENDIX I

SEWER CAPACITY AND FLOW STUDY

December 23, 2003

Mr. Larry Oaks
Engineering Technician II
Long Beach Water Department
1800 East Wardlow Road
Long Beach, CA 90807-4994

289-01

Subject: Home Depot Development—Flow Study and Recommendation for a Sewage Lift Station

Dear Mr. Oaks:

This letter report presents the results of our flow study and develops and evaluates alternatives to convey sanitary sewage from the proposed Home Depot Development to the City of Long Beach Water Department (LBWD) sewer along Vista Avenue.

Background

A developer is considering building a shopping center with Home Depot as the anchor store near the intersection of Loynes Drive and Studebaker in Long Beach, California. Initially, a gravity sewer was considered to convey sewage from the development. However, a siphon would be needed to cross under a 500-foot channel just west of the intersection. The siphon was not considered a viable option due to its high cost for the small volume and the likelihood of plugging because flow is low and intermediate. Our recommendation is to install a private lift station with an equalization tank, odor control system, and force main to convey sewage from the development to the LBWD sewer during off-peak hours. The following paragraphs describe the design basis, flow study, alternatives considered and evaluated, and our recommendations.

Design Basis

CGvL Engineers estimated the development average and peak flow of 8.5 gallons per minute (gpm) and 328 gpm respectively using daily flows and fixture units provided by Greenberg Farrow Architects and information from the Uniform Plumbing Code. For good hydraulics and to prevent plugging, the force main was designed for a minimum velocity of approximately three feet per second (3 fps) for raw sewage and 2 fps comminuted sewage. CGvL Engineers conducted a sewage flow study to determine the existing sewer flows, and remaining capacity taking into account infiltration and inflow.

There were two potential LBWD connection points for the Home Depot Development Potential connection points and flow monitoring study point are shown in Figure 1. The first location is into a manhole at the end of Vista Street, containing an 8-inch line at 0.2 percent slope, with an estimated capacity of 90 gpm with a flow depth (D) to sewer diameter (d) ratio of 0.5, the city recommended design basis. The second connection point is in the 10-inch sewer just inside the Bixby Village Golf Course to a manhole containing a 10-inch sewer at a 0.2 percent slope with an estimated capacity of 130 gpm also at a D/d of 0.5. At D/d of 0.75 the estimated capacities are 164 gpm and 282 gpm for the 8-inch sewers. CGvL Engineers and other cities will use a D/d design basis for the peak flow including infiltration and inflow (I/I)

Results of the flow study are presented in Attachment A. Peak flows of up to 180 gpm occur during the day and are greater than the design D/d without infiltration and inflow in both the 8-inch and 10-inch sewers. Early morning flows range from less than 20 gpm to 80 gpm between midnight and 7:00 a.m.

Alternatives

CGvL Engineers developed and evaluated three alternatives. Alternative 1 would locate the lift station, as shown in Figure 1, near the development entrance. All building sewers would flow by gravity to the lift station. The fiberglass lift station would be approximately 10 feet deep and 5 feet in diameter equipped with two hydroneumatic pumps capable of discharging 100 gpm at approximately 50 feet of total dynamic head (TDH). Pumps would be automatically controlled using float switches and discharge as needed to a 4-inch diameter, approximately 4250 feet long force main to maintain a 2.55 feet per second velocity to the Bixby Village Golf Course manhole and the 10-inch sewer. The force main would be underground to the bridge, mounted on the bridge. Continue underground in the street along Vista, and enter the golf course manhole approximated 1375 feet west of the intersection of Vista Street and Daroca Avenue.

Alternative 2 includes the same lift station, but equipped with two chopper pumps. Chopper pumps would be automatically controlled using float switches and discharge continuously. Chopper pumps assure that all solids are less than approximately 3/8-inch and are less likely to plug the force main. The flow is approximately 60 gpm at 50 feet TDH and would discharge to a 3-inch diameter force main following the same route as described above from the development, across the bridge and into Vista Street connecting at the first manhole and discharge to the 8-inch sewer. If capacity was available the pumps would operate throughout the day.

Alternative 3 includes a lift station with hydroneumatic pumps similar to that described above and a 10,000 gallon concrete lined holding tank. The purpose of the holding tank is to allow discharge during off-peak hours. Alternate 3 includes an odor control system to mitigate any odor that might be generated because the sewage, generated during the day is stored for 2 to 22 hours before being pumped out. Discharge from the lift station is conveyed in a 4-inch force main along the same route described for Alternative 2 to the Vista Avenue manhole and 8-inch sewer.

CGvL Engineers considered three force main piping materials, polyvinyl chloride (PVC), polyethylene, and ductile iron (DI). PVC has the advantages of low cost, easy to install, and very corrosion resistant. However, it is brittle and needs structural protection for crossing the channel. Polyethylene has similar characteristics, but is actually more flexible, has a thinner pipe wall thickness easier to install than PVC, and also needs structural support for crossing the channel. DI is more expensive to install and is subject to corrosion, but it is of sturdier construction and typical for this type of service.

Evaluation

Table 1 summarizes our cost opinion for each alternative.

Table 1 Capital Cost Opinions for Home Depot Lift Station and Force Main

Alternative	Capital Cost, dollars
1-Lift station, 4-inch force main to 10-inch sewer	$555,000
2-Lift station, chopper pumps, 3-inch force main to 8-inch sewer	$352,000
3-Lift station, storage tank, odor control system, 4-inch for main to 8-inch sewer	$458,000

The existing peak flow is greater than the flow allowed by the City design basis of D/d of 0.5. On a design basis, I/I is estimated at 50 percent of existing peak flow; therefore peak flow with I/I is 270 gpm. Using a design basis of D/d equal to 0.75 including I/I, Alternative 1 would only allow 12 gpm of flow from the Home Depot Development, rendering this alternative impractical. Since the existing peak flow is greater than the 168 gpm design basis flow (D/d equal to 0.75), Alternative 2 cannot be used. Alternative 3, discharging during off-peak hours, is the only practical alternative.

Recommendation

Existing peak flows are in excess of the City design capacity (D/d=0.5) of the potential 8-inch and 10-inch sewer points of connection for the Home Depot Development. The existing flows and infiltration and inflow are currently being conveyed without problems in the local sewers. Alternative 3 represents a practical solution to conveying a small sewage volume to the LBWD sewer in Vista during off-peak hours without exceeding the current peak flow rates.

CGvL Engineers would recommend that if the Home Depot Development is permitted that it be built to include the following requirements:

- Sewage flows from the development be conveyed to a sewage lift station by gravity after pretreatment
- Restaurant should incorporate source control methods and/or wastewater flows should be pretreated to remove fats, oils, and grease
- Design of the lift station should include a holding tank, odor control system, and a dual set of pumps that are automatically controlled to only discharge during off-peak hours
- Maximum flow rate is 100 gpm
- The force main should be shielded and/or doubled contained when crossing the channel
- Preventative and emergency maintenance logs should be kept to confirm proper operation and maintenance and controls checked after any power outage

Please contact me if you have any questions regarding this letter or the attached report.

Very truly yours,

CGvL ENGINEERS

Richard W. von Langen, P.E.
Principal

RvL:cng

Enclosure

cc: Vasanthi Ramanathan, Greenberg Farrow
Rick Rutecki, Home Depot
Chandrikaa Balendhran, CGvL Engineers

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SEWER CAPACITY STUDY FOR HOME DEPOT DEVELOPMENT
LOYNES DRIVE AND STUDEBAKER, LONG BEACH CALIFORNIA
BY
CGVL ENGINEERS

This report presents results of the seven-day sanitary sewer capacity study conducted between December 11 and December 18, 2003, at the sewer manhole (MH) in the Bixby Village Golf Course parking area. The sewer capacity study was conducted on behalf of Home Depot. Based on the projected fixture units and calculations the Home Depot Development will have a peak sanitary flow discharge of 328 gallons per minute (gpm) and an average of 8.5 gpm. We installed ISCO 2150 area-velocity flow modules and sensors in the MH to continuously record velocity and flow depth in the sewer. The flow data were downloaded from the module to a laptop computer, and are presented as graphs.

Equipment Setup and Data Collection

The flow monitoring location was in the MH in the upstream, vitrified clay (VC) 10-inch pipe. Figure 1 is a vicinity map showing the monitored MH location.

We installed low profile area-velocity sensor with mounting rings in the upstream pipe. The depth transducers (e.g. pressure cells) in the area-velocity sensors were calibrated in the field prior to installing the sensors in the pipes. The flow modules, which include a data logger, were suspended from the MH ladder rung. Flow meters were installed on Thursday, December 11 at approximately 6 p.m. and removed at the same time on Thursday December 18, 2003.

The area-velocity sensor measures average velocity by using ultrasonic sound waves and the Doppler effect. The sensor contains two ultrasonic transducers. One transmits an ultrasonic sound wave, which travels against the flow in the stream. Particles and bubbles carried by the stream reflect the sound wave back towards the receiving transducer in the sensor. Internal circuits compare the sound wave frequencies and extract the difference, determining an average velocity. An increase or decrease in the reflected wave frequency indicates forward or reverse flow. The degree of change is proportional to the flow stream velocity. When a solid object covers the leading edge of the sensor, where the transducers are located, the velocity reading becomes negative.

The flow modules were programmed to record depth, velocity, and flow data at five-minute intervals. Flow rates were calculated by the continuity equation (flow = velocity x cross-sectional area) using circular pipe geometry. The flow meter measures velocities every minute and stores average readings every five minutes. Depth is measured and stored every five minutes.

Data Review and Results

Figures 2 through 6 present five-minute time series plots of instantaneous flow rate and d/D, (e.g. the ratio between depth of flow and pipe diameter) beginning at 12 a.m. each day. The plots were created with Flowlink® software, from ISCO. Each graph has two panes; the top pane plots d/D and the bottom pane plots the flow rate. The average d/D and total daily flow is shown at the top of each graph.

Peak flow depth over the seven days was 5.41 inches on Wednesday at 9:45 a.m., corresponding to a 0.541 d/D and flow of 180 gpm. Table 1 shows the peak flow depth reached each day, the time it occurred, and associated d/D, velocity, and flow rate.

TABLE 1 City of Long Beach Sewer Manhole at Bixby Village Golf Course Parking Lot, 10-inch VCP

Day	Date	Time	Maximum Level, feet	Maximum, d/d	Velocity, ft/s	Flow, gpm
Friday	12/12/2003	8:15 AM	0.457	0.548	1.18	160
Saturday	12/13/2003	11:05 AM	0.444	0.533	1.19	160
Sunday	12/14/2003	11:45 AM	0.421	0.505	1.25	160
Monday	12/15/2003	8:15 AM	0.450	0.540	1.13	170
Tuesday	12/16/2003	9:55 AM	0.446	0.535	1.15	150
Wednesday	12/17/2003	9:45 AM	0.459	0.551	1.37	180
Thursday	12/18/2003	8:55 AM	0.426	0.511	1.24	160

Depth, velocity, and flow data were used to calculate the Manning roughness coefficient, using pipe slopes indicated in the sewer drawing from the City. Sewer slope for the 8-inch VCP, 10-inch VCP pipe upstream of MH is 0.2 percent. Using the resulting Manning coefficient, we calculated the maximum flow each pipe could handle at a d/D of 0.75, our recommended maximum design d/D for peak flows including infiltration and inflow. Peak allowable flows are 282 gpm for 10-inch VCP and 164 gpm for 8-inch VCP.

TRAFFIC IMPACT ANALYSIS

HOME DEPOT

LONG BEACH, CALIFORNIA

This traffic study has been prepared under the supervision of
Leslie E. Card, P.E.

Signed ____

LSA

TRAFFIC IMPACT ANALYSIS

HOME DEPOT

LONG BEACH, CALIFORNIA

Submitted to:

City of Long Beach
Department of Public Works
Traffic and Transportation Bureau
333 West Ocean Boulevard, 10th Floor
Long Beach, California 90802

Prepared by:

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20 Executive Park, Suite 200
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(949) 553-0666

LSA Project No. CLB430

LSA

April 2005

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EXECUTIVE SUMMARY

LSA Associates, Inc. (LSA) has prepared the following analysis to identify the short-term traffic impacts resulting from the development of the Home Depot Center project in the City of Long Beach (City). LSA has prepared this analysis with the objectives and methodologies set forth in the City of Long Beach Traffic and Transportation Bureau Development Traffic Impact–Preliminary Assessment form, 2002 Congestion Management Program (CMP) for Los Angeles County, California Department of Transportation (Caltrans) Guide for the Preparation of Traffic Impact Studies, and applicable provisions of the California Environmental Quality Act (CEQA).

The Long Beach Home Depot Center is located east of Studebaker Road and Loynes Drive in the City of Long Beach. The proposed project considers the development of a retail center that includes approximately 140,000 square feet for a Home Depot store (including a garden center), approximately 12,000 square feet for various retail pads, and approximately 6,000 square feet for restaurant use. The project includes the demolition of an existing tank farm and ancillary equipment. The project is proposed for construction by the year 2006.

This study analyzes the a.m. and p.m. peak-hour levels of service during a typical weekday period and midday peak-hour levels of service during a weekend typical period (Saturday) at 11 intersections. Project impacts were determined based on the analysis of the following scenarios, consistent with City of Long Beach requirements:

1. Existing conditions
2. Existing plus project conditions
3. Cumulative (Project Opening Year) conditions
4. Cumulative (Project Opening Year) plus project conditions

Based on the results of this traffic impact analysis, the proposed project would significantly impact four study area intersections in the cumulative horizon, based on the City's performance criteria. Intersection impacts are described below:

1. **Studebaker Road/State Route (SR-22) westbound ramps.** The proposed project would significantly impact this intersection during the weekday p.m. peak hour. Improvements to this location would require potential encroachment into the Los Cerritos Channel immediately adjacent and parallel to Studebaker Road. In addition, based on discussions with Caltrans District 7 staff, Caltrans has no plans to improve this facility. As such, there are no feasible improvements at this location that would mitigate the project's impact, and as a result, the project would create a significant unavoidable impact at this intersection.
2. **Studebaker Road/2nd Street.** The proposed project would significantly impact this intersection during the weekday p.m. peak hour and weekend midday peak hour. Converting the existing westbound right-turn lane into a through lane and constructing an exclusive westbound right-turn lane would mitigate the project's traffic impact at this intersection during both time periods. The

recommended improvement would decrease the cumulative plus project Intersection Capacity Utilization (ICU) from 0.975 (LOS E) to 0.868 (LOS D) in the a.m. peak hour, 1.002 (LOS F) to 0.937 (LOS E) in the p.m. peak hour, and 0.980 (LOS E) to 0.933 (LOS E) in the weekend peak hour.

This improvement will require property acquisition from the adjacent property on the northeast corner of the intersection along 2nd Street. This intersection was identified as an impacted intersection in the Boeing Specific Plan Traffic Impact Analysis (December 2002). The report recommended the same improvements mentioned above with a fair-share contribution of approximately 85 percent for this improvement. To mitigate the impact at this intersection to a less than significant level, Home Depot would need to construct this improvement and be reimbursed for the Boeing project's fair-share commitment.

3. **Pacific Coast Highway(PCH)/7th Street.** The proposed project would significantly impact this intersection during the weekend midday peak hour. Due to right-of-way constraints along 7th Street, there are no feasible improvements at this location that would mitigate the project's impact. Therefore, the proposed project would create a significant unavoidable impact at this location.
4. **PCH/2nd Street.** The proposed project would significantly impact this intersection during the weekend midday peak hour. Due to right-of-way constraints at this intersection, there are no feasible improvements that would mitigate the project's impact. Therefore, the proposed project would create a significant unavoidable impact at this location.

The project applicant has also agreed to construct other improvements that will enhance traffic flow and safety within the study area. The following project design features are proposed as part of the project. Since numbers 1–3 were incorporated into the modeling calculations for the proposed project, they are also included as required mitigation measures.

1. Provide one westbound left-turn lane, one westbound through-lane, and one westbound right-turn lane at the project driveway at the Studebaker Road/Loynes Drive intersection. In addition, a northbound right-turn lane and a southbound left-turn lane will be constructed. The inside eastbound right-turn lane will be converted to an eastbound through lane for vehicles entering the project site.
2. Change the traffic signal phasing for the northbound and southbound left-turn movements at Studebaker Road/Loynes Drive to protected-permissive turn movements.
3. Restripe northbound Studebaker Road (36 feet wide) between the south driveway and the SR-22 eastbound ramps to provide three (12-foot-wide) through lanes. The third northbound through lane will terminate at the northbound right-turn lane at the SR-22 eastbound ramps. Any encroachment into State right-of-way will require review and approval by Caltrans.
4. In conjunction with and upon approval by Caltrans and the City Public Works Director, install traffic signal interconnect along Studebaker Road from 2nd Street to the SR-22 westbound ramp signal. This will allow vehicles from 2nd Street to have progressive flow to the freeway on-ramp on Studebaker Road.
5. In conjunction with and upon approval by Caltrans and the City Public Works Director, develop and implement new traffic signal coordination timing for Studebaker Road for both weekday and

weekend traffic conditions. This will provide signal coordination utilizing the new interconnect described above.

6. In conjunction with and upon approval by Caltrans and the City Public Works Director, develop and implement (with Caltrans) new traffic signal coordination timing along 2nd Street from Marina Drive to Studebaker Road using existing interconnect. This should reduce delay and queuing at PCH/2nd Street. Currently, there is no coordination between Caltrans-operated signals and City-operated signals.
7. In conjunction with and upon approval by Caltrans and the City Public Works Director, develop and implement (with Caltrans) new coordination timing along PCH between Studebaker Road and 7th Street for both weekday and weekend traffic conditions.
8. In conjunction with and upon approval by Caltrans and the City Public Works Director, design and construct pedestrian access across the Loynes Drive bridge west of Studebaker Road. This will provide convenient accessible, (i.e., ADA) pedestrian access from the adjacent residential area to the proposed neighborhood shops and restaurants.
9. In conjunction with and upon approval by Caltrans and the City Public Works Director, design and stripe a bicycle lane on Loynes Drive from Studebaker Road to PCH, including new bicycle push buttons at PCH/Loynes Drive and Studebaker Road/Loynes Drive.

A CMP analysis was conducted during the a.m. and p.m. peak hour, consistent with the 2002 CMP for Los Angeles County. Based on the results of the analysis, the CMP intersections (PCH/7th Street and PCH/2nd Street) operate at unsatisfactory levels of service in the a.m. and p.m. peak hour during the cumulative baseline condition. However, the proposed project does not significantly impact the CMP intersections by 2 percent of the capacity (ICU $\geq$ 0.02). Therefore, the proposed project is consistent with the requirements of the CMP.

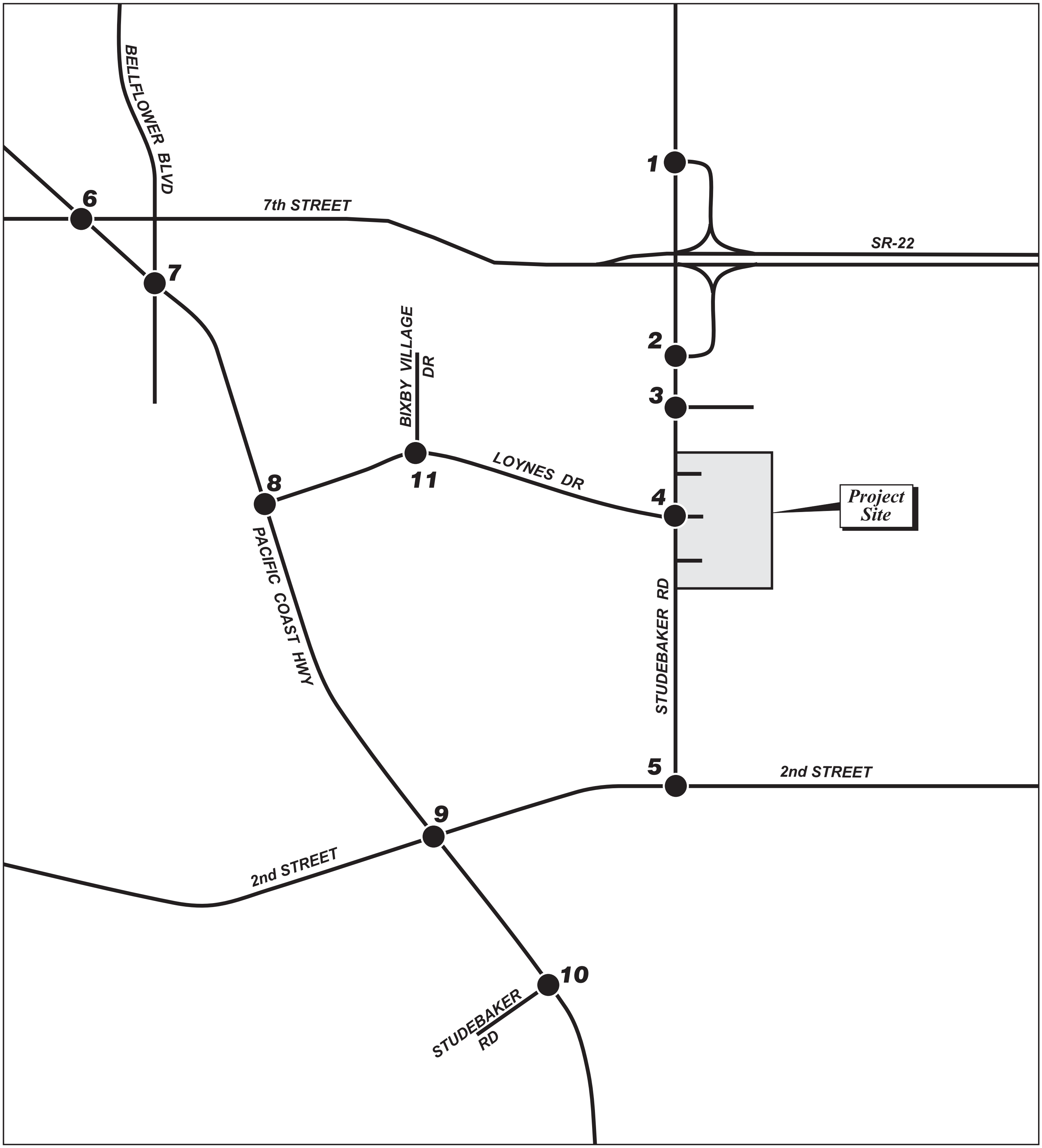
The on-site circulation and parking supply has been designed to meet or exceed the City of Long Beach's standards.

INTRODUCTION

The purpose of this traffic impact analysis is to identify the potential circulation impacts associated with the development of a Home Depot store and various retail pads located east of Studebaker Road and Loynes Drive in the City of Long Beach. Figure 1 shows the location of the project site and the study area intersections analyzed in this report.

Issues addressed in this analysis include the operation of the existing roadway system in the area, local off-site intersection impacts, site access, and internal circulation. The traffic analysis for the proposed project examines four scenarios:

1. Existing conditions
2. Existing plus project conditions



LSA

FIGURE 4.11.1

LEGEND

5 - Study Area Intersection

N

SCHEMATIC - NOT TO SCALE

Home Depot East Long Beach

Project Location and Study Area Intersections

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3. Cumulative (Project Opening Year) conditions
4. Cumulative (Project Opening Year) plus project conditions

Prior to preparation of this traffic analysis, the City Traffic and Transportation Bureau staff provided a Development Traffic Impact–Preliminary Assessment form that outlined the study area and methodology for the traffic impact analysis. LSA prepared the traffic impact analysis based on the requirements outlined in the City's Preliminary Assessment form (included in Appendix A).

Project Description

The proposed project considers the development of a retail center that includes approximately 140,000 square feet for a Home Depot store (including a garden center), approximately 12,000 square feet for various retail pads, and approximately 6,000 square feet for restaurant use. The project includes the demolition of an existing tank farm and ancillary equipment. The project is proposed for construction by the year 2006. Figure 2 shows the site plan for the proposed Home Depot Center.

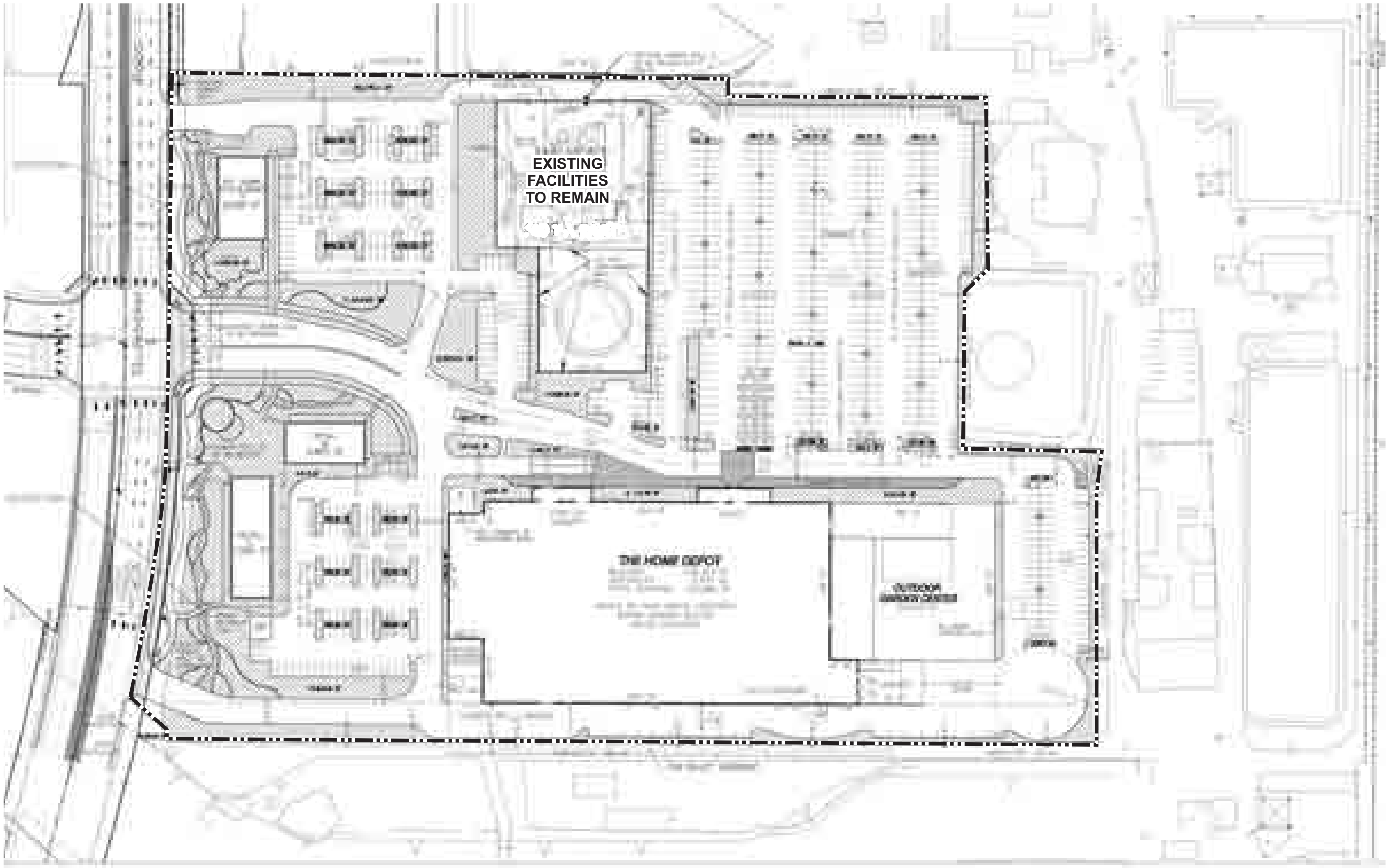
METHODOLOGY

The traffic impact analysis is conducted in a format consistent with the objectives and methodologies set forth in the City Traffic and Transportation Bureau Development Traffic Impact–Preliminary Assessment form, 2002 CMP for Los Angeles County, Caltrans Guide for the Preparation of Traffic Impact Studies, and applicable provisions of CEQA.

As requested by the City, the study area analyzed in this report includes the following 11 intersections. Figure 3 provides the existing geometrics and traffic control devices at each study area intersection.

Study Area Intersections

1. Studebaker Road/SR-22 westbound ramps*
2. Studebaker Road/SR-22 eastbound ramps*
3. Studebaker Road/AES Plant Driveway
4. Studebaker Road/Loynes Drive
5. Studebaker Road/2nd Street
6. PCH/7th Street*+
7. PCH/Bellflower Boulevard*
8. PCH/Loynes Drive*
9. PCH/2nd Street*+



LSA

FIGURE 2

- Project Area

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0 100 200
FEET

SOURCE: Greenberg Farrow

Home Depot East Long Beach

Site Plan

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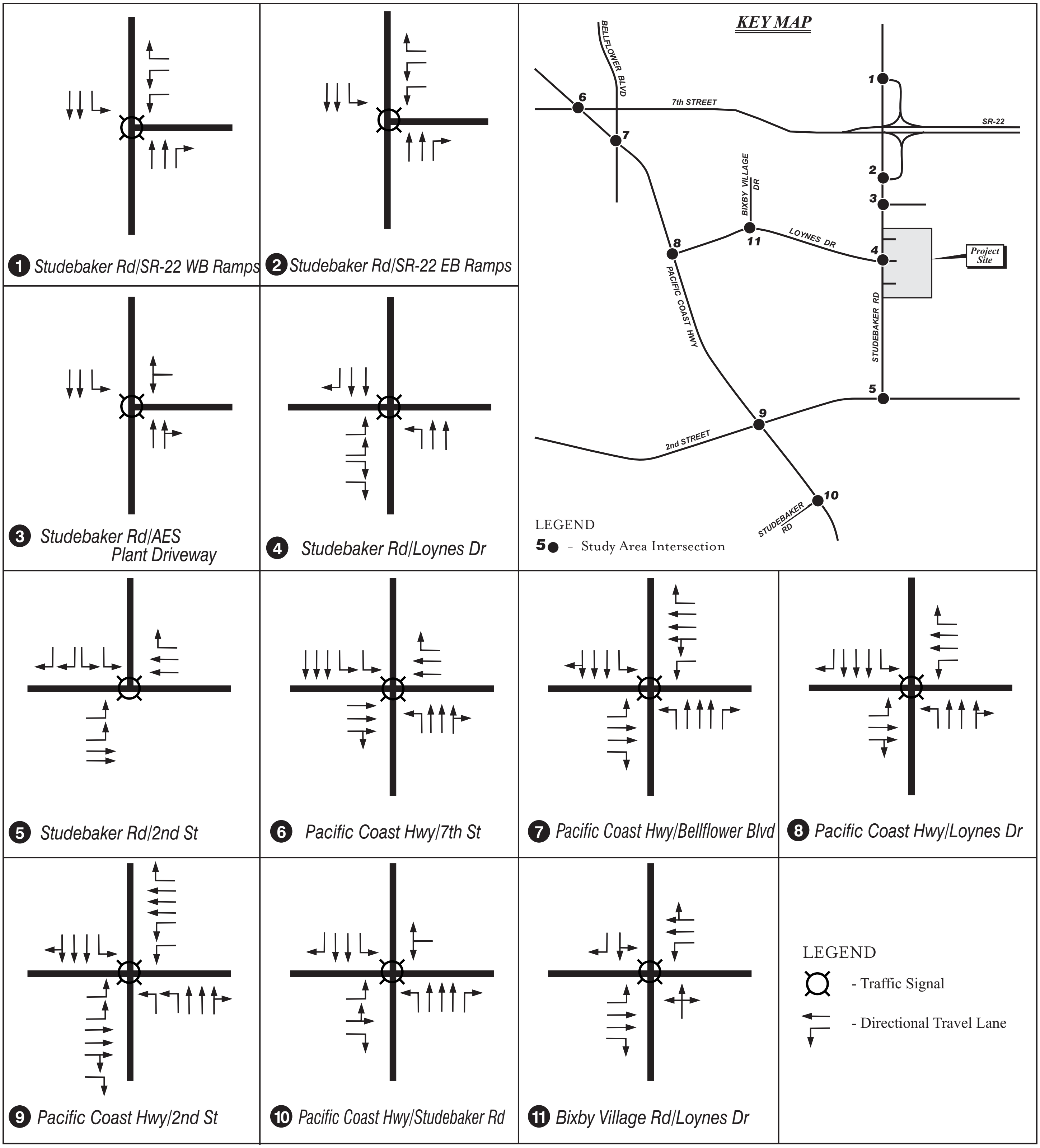

LSA

FIGURE 3

Note: Pacific Coast Highway/Loynes Drive – third northbound through lane included based on existing operation.

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Long Beach Home Depot

Existing Geometrics and Traffic Control Devices

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10. PCH/Studebaker Road*

11. Loynes Drive/Bixby Village Drive

* State (Caltrans) Facility
\+ CMP Monitoring Intersection

For purposes of this analysis, the intersection of PCH/Loynes Drive assumes one northbound left-turn lane, two northbound through lanes and one northbound shared through-right-turn lane. Currently, the northbound approach is striped to include one left-turn lane, one through lane, and one shared through-right-turn lane. However, based on LSA's field observations, the outside through-right-turn lane is approximately 23 feet wide. This lane currently functions as a third shared through-right-turn lane. There are already three receiving lanes on the north leg of the intersection.

The ICU methodology was used to determine levels of service (LOS) for the signalized study area intersections, consistent with the City's requirements. This methodology compares the volume-to-capacity (v/c) ratios of conflicting turn movements at an intersection, sums these critical conflicting v/c ratios for each intersection approach, and determines the overall ICU. The resulting ICU is expressed in terms of LOS, where LOS A represents free-flow activity, and LOS F represents overcapacity operation. LOS is a qualitative assessment of the quantitative effects of such factors as traffic volume, roadway geometrics, speed, delay, and maneuverability on roadway and intersection operations. The LOS criteria for signalized intersections using the ICU methodology are presented below.

LOS	Description
A	No approach phase is fully utilized by traffic, and no vehicle waits longer than one red indication. Typically, the approach appears quite open, turns are made easily, and nearly all drivers find freedom of operation.
B	This service level represents stable operation, where an occasional approach phase is fully utilized, and a substantial number are nearing full use. Many drivers begin to feel restricted within platoons of vehicles.
C	This level still represents stable operating conditions. Occasionally, drivers may have to wait through more than one red signal indication, and backups may develop behind turning vehicles. Most drivers feel somewhat restricted, but not objectionably so.
D	This level encompasses a zone of increasing restriction approaching instability at the intersection. Delays to approaching vehicles may be substantial during short peaks within the peak period; however, enough cycles with lower demand occur to permit periodic clearance of developing queues, thus preventing excessive backups.
E	Capacity occurs at the upper end of this service level. It represents the most vehicles that any particular intersection approach can accommodate. Full utilization of every signal cycle is attained no matter how great the demand.
F	This level describes forced flow operations at low speeds, where volumes exceed capacity. These conditions usually result from queues of vehicles backing up from a restriction downstream. Speeds are reduced substantially, and stoppages may occur for short or long periods of time due to the congestion. In the extreme case, speed can drop to zero.

The relationship between LOS and the ICU value (i.e., v/c ratio) is as follows:

Level of Service	Intersection Capacity Utilization
A	$\leq$ 0.600
B	0.610–0.700
C	0.710–0.800
D	0.810–0.900
E	0.910–1.000
F	> 1.000

Consistent with the City's requirements, the ICU calculations utilize a lane capacity value of 1,600 vehicles per hour (vph) per lane, and a dual turn lane capacity of 2,880 vph. Based on the City's requirements, a clearance adjustment factor (ranging from 0.10 to 0.18) was added to each LOS calculation. The clearance and lost time factors for the different critical phases are summarized below.

Number of Critical Phases	Left-Turn Phasing Type	Clearance and Loss Time Factor
2	Permissive	0.10
3	Protected-Permissive	0.12
3	Fully-Protected	0.15
4	Protected-Permissive	0.14
4	Fully-Protected	0.18

The proposed project includes the installation of a protected-permissive left-turn (PPLT) signal at the intersection of Studebaker Road and Loynes Drive (northbound/southbound direction). To calculate the ICU value for a PPLT phased signal, the left-turn volume is decreased by two vehicles per cycle. The two vehicles represent the number of vehicles that will turn left at the intersection during the permissive yellow phase. For purposes of this analysis, LSA assumed 33 cycles during the a.m. and midday (weekend) peak hour (110-second cycle) and 27 cycles during the p.m. peak hour (130-second cycle). This results in a reduction of 66 a.m. peak-hour and weekend trips and 54 p.m. peak-hour trips based on the PPLT signal phasing.

The City considers intersections with an ICU of 0.90 (LOS D) as the upper limit of satisfactory operations. A project impact at an intersection is considered significant if the intersection operates at an unsatisfactory LOS (LOS E or F) and the project increases the ICU by 2 percent or higher (ICU $\geq$ 0.02), or the project traffic causes the intersection to deteriorate from LOS D to LOS E or F.

Caltrans Level of Service Methodology. The 2000 HCM methodology was used to determine intersection levels of service at signalized intersections along PCH and SR-22, consistent with the Caltrans Guide for the Preparation of Traffic Impact Studies. The HCM signalized intersection methodology describes level of service in terms of overall control delay. Control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. The relationship of delay and level of service at signalized intersections is summarized below.

Level of Service	Signalized Intersection Delay per Vehicle (sec)
A	≤10.0
B	>10.0 and ≤20.0
C	>20.0 and ≤35.0
D	>35.0 and ≤55.0
E	>55.0 and ≤80.0
F	>80.0

The HCM analysis at study area intersections to satisfy Caltrans requirements is provided later in this report.

EXISTING CONDITIONS

Existing Circulation System

Key roadways in the vicinity of the proposed project are as follows:

State Route 22 (SR-22). SR-22 is located northeast of the project site. This extension of 7th Street becomes a State Route at Pacific Coast Highway and extends through Orange County. Access to the project site from the SR-22 Freeway is provided via eastbound and westbound on/off ramps at Studebaker Road. SR-22 is also classified as a State Freeway in the 2002 Los Angeles County CMP.

Pacific Coast Highway (PCH). PCH is located west of the project site and is a Regional Corridor that extends throughout Los Angeles and Orange Counties. Access to the project site from PCH is provided via 2nd Street and Loynes Drive. This arterial is classified as a Regional Corridor in the City’s Transportation Element. PCH is also classified as a State Highway (Arterial) in the 2002 Los Angeles County CMP.

Studebaker Road. Studebaker Road is a four-lane north-south roadway located adjacent to the project site and parallel to the Los Cerritos Channel. This roadway provides access to the project site via the AES Alamitos Plant driveway. Orange County Transportation Authority (OCTA) bus stops are located along northbound and southbound Studebaker Road, adjacent to the project site. This road is served by OCTA Routes 1 and 60. Studebaker Road is classified as a Major Arterial.

Loynes Drive. Loynes Drive is a four-lane east-west roadway located west of the project site. This roadway terminates at Studebaker Road, across from the project site. Loynes Drive is classified as a Collector Street.

2nd Street. 2nd Street is a six-lane east-west arterial located south of the project site. 2nd Street is classified as a Major Arterial (Scenic Route) in the City limits. This arterial is named Westminster Avenue at the Orange County line.

7th Street. 7th Street is a six-lane east-west arterial located northwest of the project site. This arterial transitions into SR-22 at PCH. 7th Street is classified as a Major Arterial.

Bellflower Boulevard. Bellflower Boulevard is a six-lane north-south arterial located northwest of the project site. This roadway is classified as a Major Arterial in the City's Transportation Element.

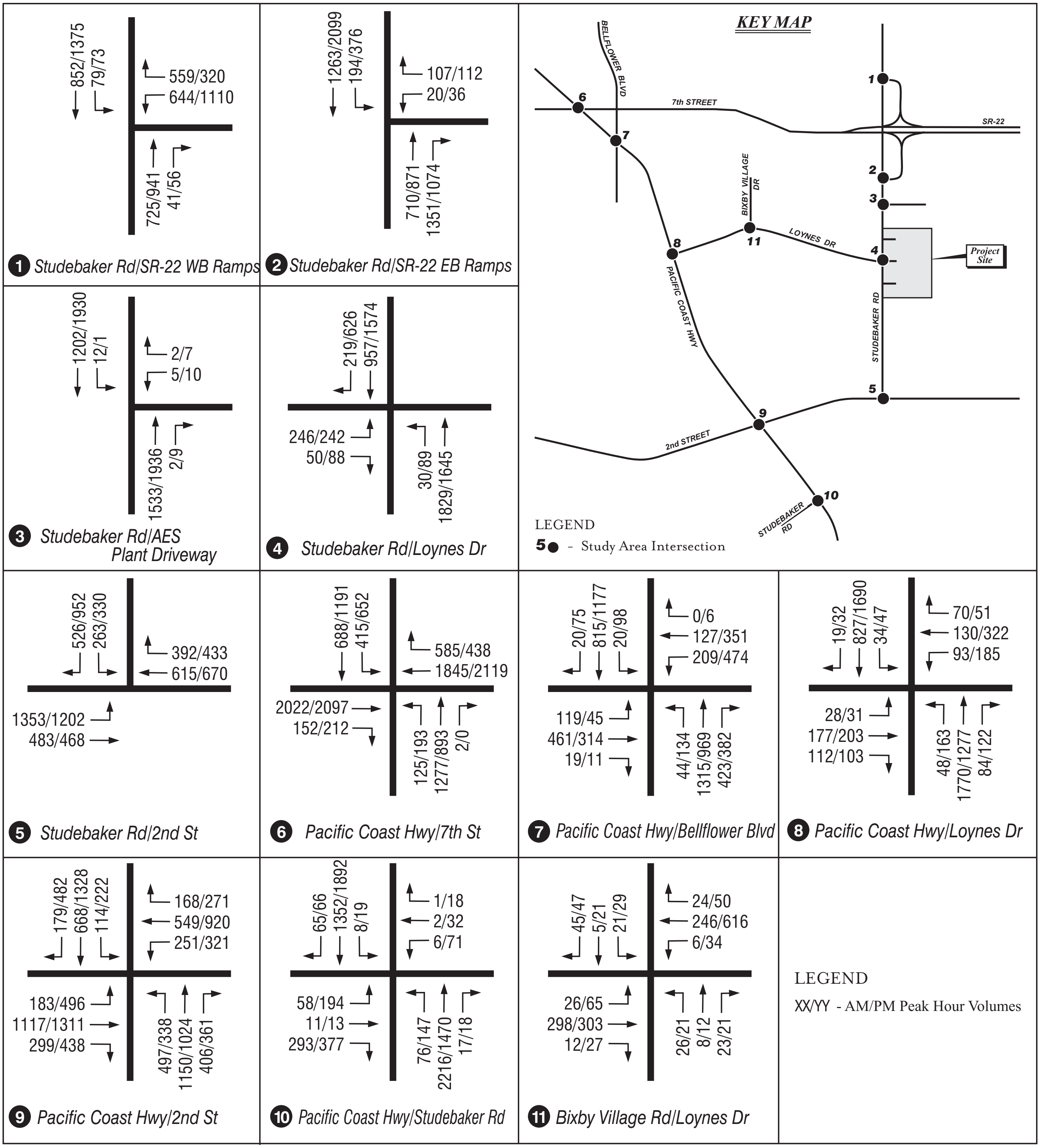
Existing Traffic Volumes

Weekday peak-period intersection turn volumes were provided by the City for four study area intersections. The remaining weekday peak-hour intersection turn volumes were collected by Southland Car Counters in January 2004. Figure 4 presents the existing baseline a.m. and p.m. peak-hour turn movement volumes for the study area intersections. Appendix B provides the existing count data.

Existing Intersection Level of Service Analysis

Table A summarizes the results of the existing a.m. and p.m. peak-hour LOS analysis for all signalized study area intersections utilizing the ICU methodology. The existing LOS calculation worksheets are contained in Appendix C. As this table indicates, all study area intersections currently operate at an acceptable level of service (i.e., LOS D or better) with the following exceptions:

- **Studebaker Road/SR-22 westbound ramps:** LOS E in the p.m. peak hour
- **Studebaker Road/2nd Street:** LOS F in the a.m. and p.m. peak hours
- **PCH/7th Street:** LOS F in the a.m. and p.m. peak hours
- **PCH/2nd Street:** LOS F in the p.m. peak hour
- **PCH/Studebaker Road:** LOS F in the p.m. peak hour



LSA

FIGURE 4

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Long Beach Home Depot

Existing A.M. and P.M. Peak Hour Traffic Volumes

Table A: Existing Intersection Level of Service Summary

Intersection		AM Peak Hour		PM Peak Hour	
		ICU	**LOS**	**ICU**	**LOS**
1	Studebaker Rd/SR-22 WB Ramps	0.650	B	0.965	E
2	Studebaker Rd/SR-22 EB Ramps	0.552	A	0.818	D
3	Studebaker RD/AES Plant Driveway	0.611	B	0.734	C
4	Studebaker Rd/Loynes Road	0.807	D	0.792	C
5	Studebaker Rd/2nd Street	0.903	D	0.891	D
6	PCH/7th Street	1.167	F	1.255	F
7	PCH/Bellflower Boulevard	0.683	B	0.787	C
8	PCH/Loynes Drive	0.706	C	0.815	D
9	PCH/2nd Street	0.895	D	1.059	F
10	PCH/Studebaker Road	0.809	D	1.144	F
11	Bixby Village Road/Loynes Drive	0.245	A	0.401	A

CUMULATIVE (PROJECT OPENING YEAR) CONDITIONS

According to the Project applicant, the Home Depot Center development is proposed for completion by the year 2006. To develop a cumulative (2006) project opening condition, traffic volumes for other committed and/or approved (cumulative) developments within this time frame were added to the existing baseline traffic volumes. Furthermore, LSA and the City staff discussed committed roadway improvements within the study area that are programmed prior to 2006. The city identified a committed improvement at the intersection of PCH/2nd Street, which includes the addition of a second southbound left-turn lane and an exclusive southbound right-turn lane. Based on this information, the improvement at this intersection was included in the cumulative baseline geometrics.

Two cumulative projects were identified in the cumulative condition based on discussions with the City of Long Beach and of the City of Seal Beach Planning Departments; (1) 120 Studebaker, and (2) the Boeing Specific Plan. The 120 Studebaker development considers the development of a 60,650-square-foot shopping center, located at the intersection of PCH/Studebaker Road, south of the project site. Traffic generated by the 120 Studebaker project traffic was assigned to the local streets manually using trip distribution assumptions similar to the proposed Home Depot project.

The Boeing Specific Plan project considers the build out of the Boeing Industrial Park, located east of the project site in the City of Seal Beach. The Boeing Specific Plan is expected to be completed in four phases with an anticipated build out by 2006. The project considers the construction of 628,000 square feet for an industrial park, a 120-room hotel, 32,500 square feet of retail/restaurant use, and

690,000 square feet of light industrial use. LSA added the traffic volumes from this cumulative project based on the Boeing Space and Communications Group Specific Plan Traffic Impact Report (December 2002).

Project trip generation for both approved/pending projects was provided by the City of Long Beach and City of Seal Beach Planning Departments and is presented in Table B. Figure 5 illustrates the location of the cumulative projects. Figure 6 illustrates the cumulative projects' trip assignments.

To determine the cumulative baseline traffic conditions, traffic generated by the approved/pending projects were added to existing traffic volumes at the study area intersections. An ambient growth rate of 1.3 percent per year (a total of 2.6 percent) was also added to existing baseline traffic volumes to develop the cumulative conditions. The growth rate for this region was identified in the Los Angeles County CMP (Appendix D). Figure 7 shows the resulting cumulative baseline a.m. and p.m. peak-hour traffic volumes.

Table C summarizes the results of the cumulative baseline a.m. and p.m. peak-hour LOS analysis for all signalized study area intersections utilizing the ICU methodology. The cumulative LOS calculation worksheets are contained in Appendix D. As this table indicates, all study area intersections are forecast to operate at an acceptable LOS (LOS D or better) in the peak hours, with the following exceptions:

- **Studebaker Road/SR-22 westbound ramps:** LOS F in the p.m. peak hour
- **PCH/7th Street:** LOS F in the a.m. and p.m. peak hours
- **PCH/Loynes Drive:** LOS E in the a.m. peak hour
- **PCH/2nd Street**: LOS E in the a.m. and LOS F in the p.m. peak hour
- **PCH/Studebaker Road:** LOS F in the p.m. peak hour

PROJECT CONDITIONS

Trip Generation

The daily and peak-hour trips for the project were generated using trip rates from the Institute of Transportation Engineers (ITE) Trip Generation manual (7th Edition, 2003). The trip rates for home improvement superstore (Land Use Code 862), shopping center (Land Use Code 820), and sit-down restaurant (Land Use Code 932) were used to calculate the trips generated by the proposed project. The project trip generation is presented in Table D.

The trip generation estimated for the project site includes the reduction for pass-by trips. Pass-by trip reduction factors of 13 percent for daily trips, 15 percent for a.m. peak-hour trips, and 25 percent for p.m. peak-hour trips were applied to the project site. The pass-by trip reduction factors were based on "pass-by" surveys conducted at three existing Home Depot stores in Los Angeles and Orange County by Barton-Aschman Associates, Inc. (February 6, 1996). The "pass-by" survey by Barton-Aschman Associates, Inc. is included in Appendix E.

Table B: Approved/Pending Projects Trip Generation Summary

Land Use	Size	Units	ADT	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total
1. 120 Studebaker									
Shopping Center									
Trip Rate		TSF			ITE Regression Equation [2]				
Trip Generation	60.650	TSF	4,907	71	45	116	216	234	450
2. Boeing Specific Plan (Pacific Gateway Center)									
Existing Uses to Remain in PA 1			6,590	861	121	982	169	813	982
Planning Area 1									
Light Industrial	345.000	TSF	2,720	309	42	351	44	320	364
Planning Area 2									
Light Industrial	345.000	TSF	2,720	309	42	351	44	320	364
Trip Credits			-1,540	-183	-32	-215	-40	-173	-211
Net Trip Generation PA 2			**1,180**	**126**	**10**	**136**	**4**	**147**	**153**
Planning Area 3									
Light Industrial	628.000	TSF	5,050	634	86	719	97	714	811
Planning Area 4									
Hotel	120	Rooms	870	41	29	70	44	30	74
Shopping Center	12.500	TSF	1,790	28	18	46	76	83	159
Quality Restaurant	10.000	TSF	900	7	1	8	50	25	75
High-Turnover Restauran	10.000	TSF	1,300	48	45	93	65	43	108
			4,860	124	93	217	235	181	416
Pass-By Adjustment							-76	-58	-134
Net Trip Generation PA 4			**4,860**	**124**	**93**	**217**	**159**	**123**	**282**
Total Trip Generation [3]			20,400	2,054	352	2,406	473	2,117	2,590
Total Cumulative Trip Generation			**25,307**	**2,125**	**397**	**2,522**	**689**	**2,351**	**3,040**

Notes:

[1] Trip Rates referenced in the Institute of Transportation Engineers, *Trip Generation*, 7th Edition (2003)

Land Use Code: 820 (Shopping Center)

[2] Daily: Ln(T) = 0.65 Ln(X) + 5.83 (In/Out - 50:50)

AM Peak: Ln(T) = 0.60 Ln(X) + 2.29 (In/Out - 61:39)

PM Peak: Ln (T) = 0.66 Ln(X) + 3.40 (In/Out - 48:52)

[3] Trip Generation referenced in the Boeing Space & Communication Group Specific Plan Traffic Impact Analysis, conducted by LLG Engineers (December 2002).

TSF = Thousand Square Feet

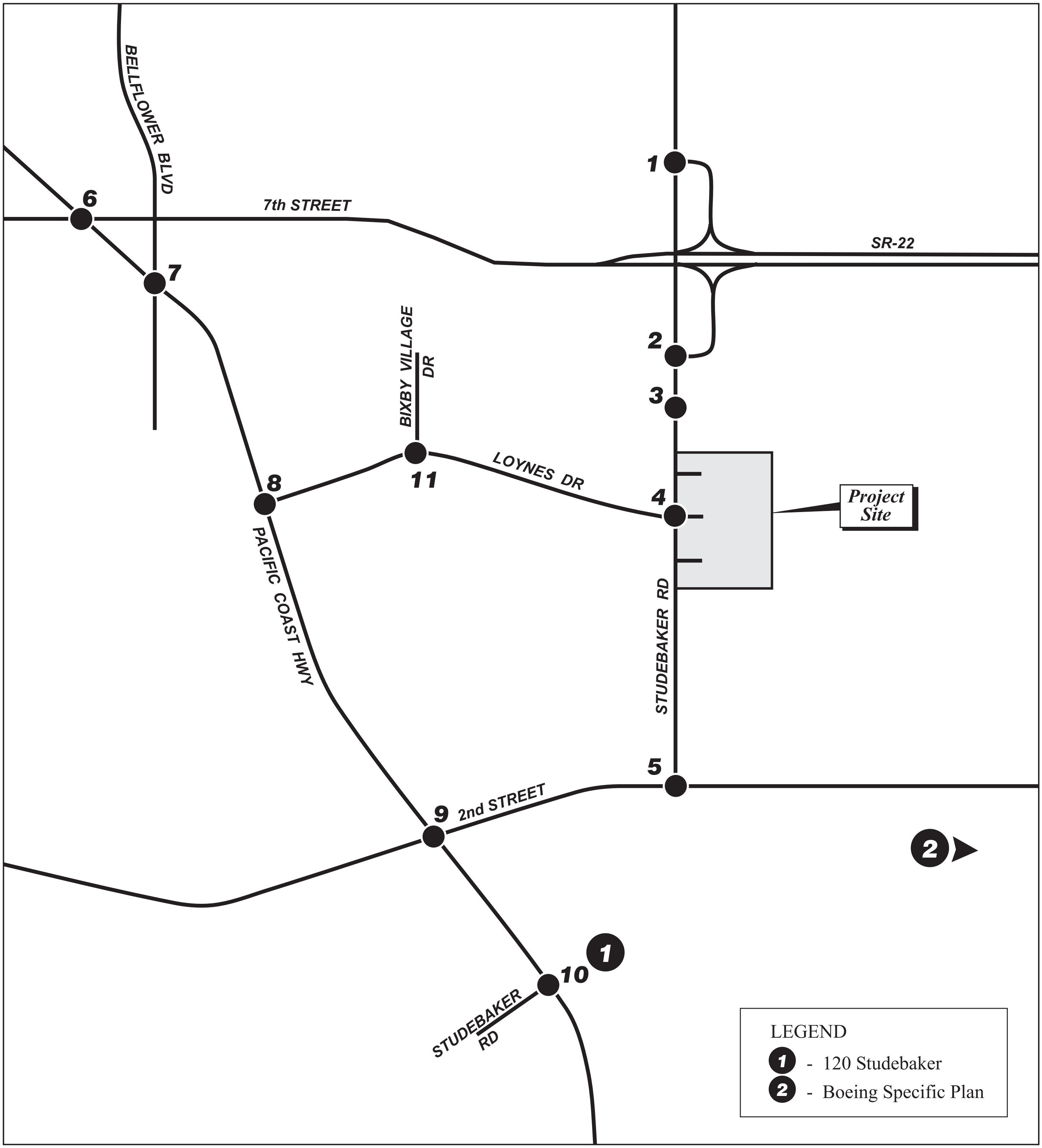

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FIGURE 5

5 - Study Area Intersection

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Long Beach Home Depot

Cumulative Projects Location Map

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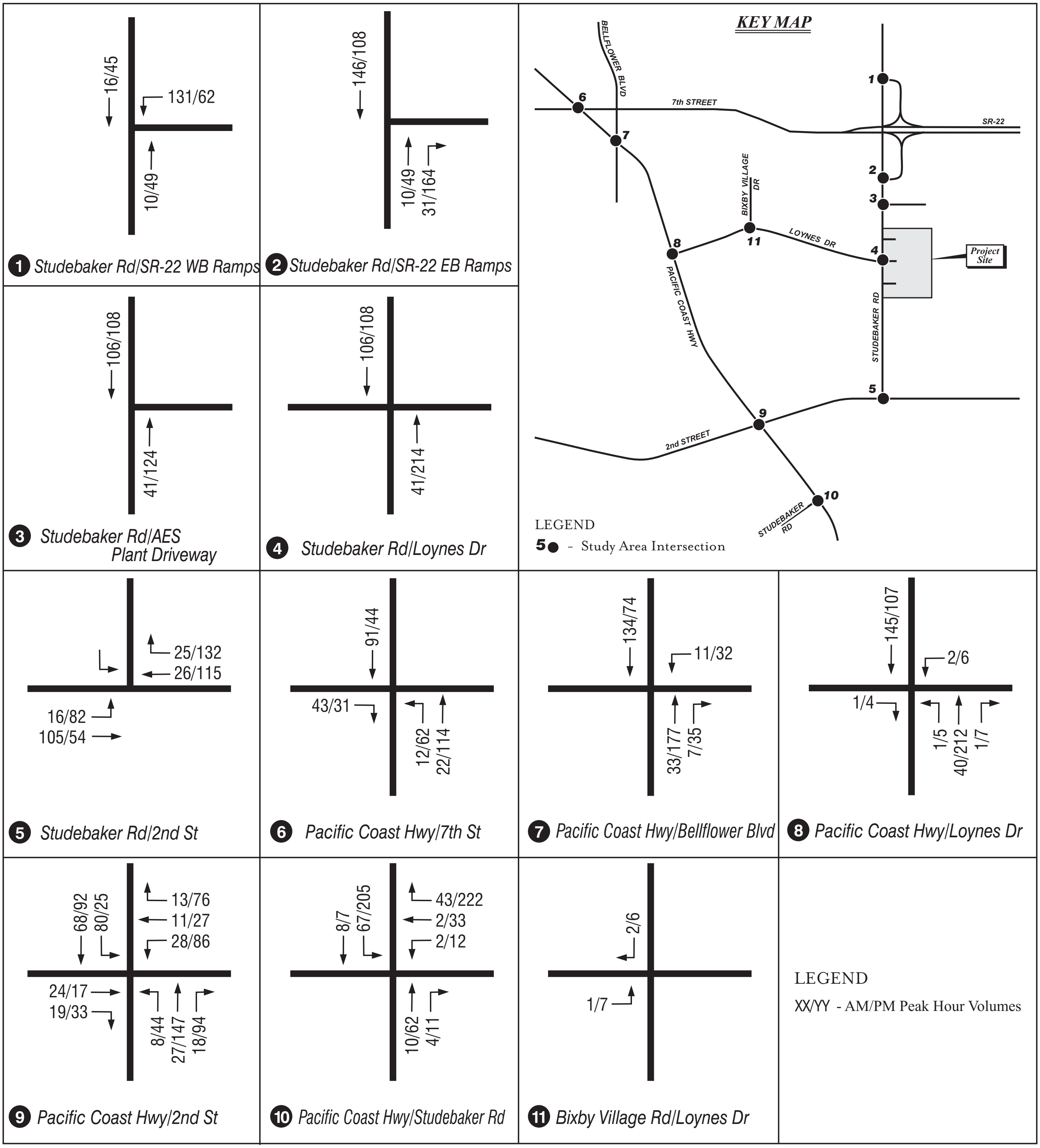

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FIGURE 6

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SCHEMATIC - NOT TO SCALE

Long Beach Home Depot

Cumulative Projects Trip Assignment

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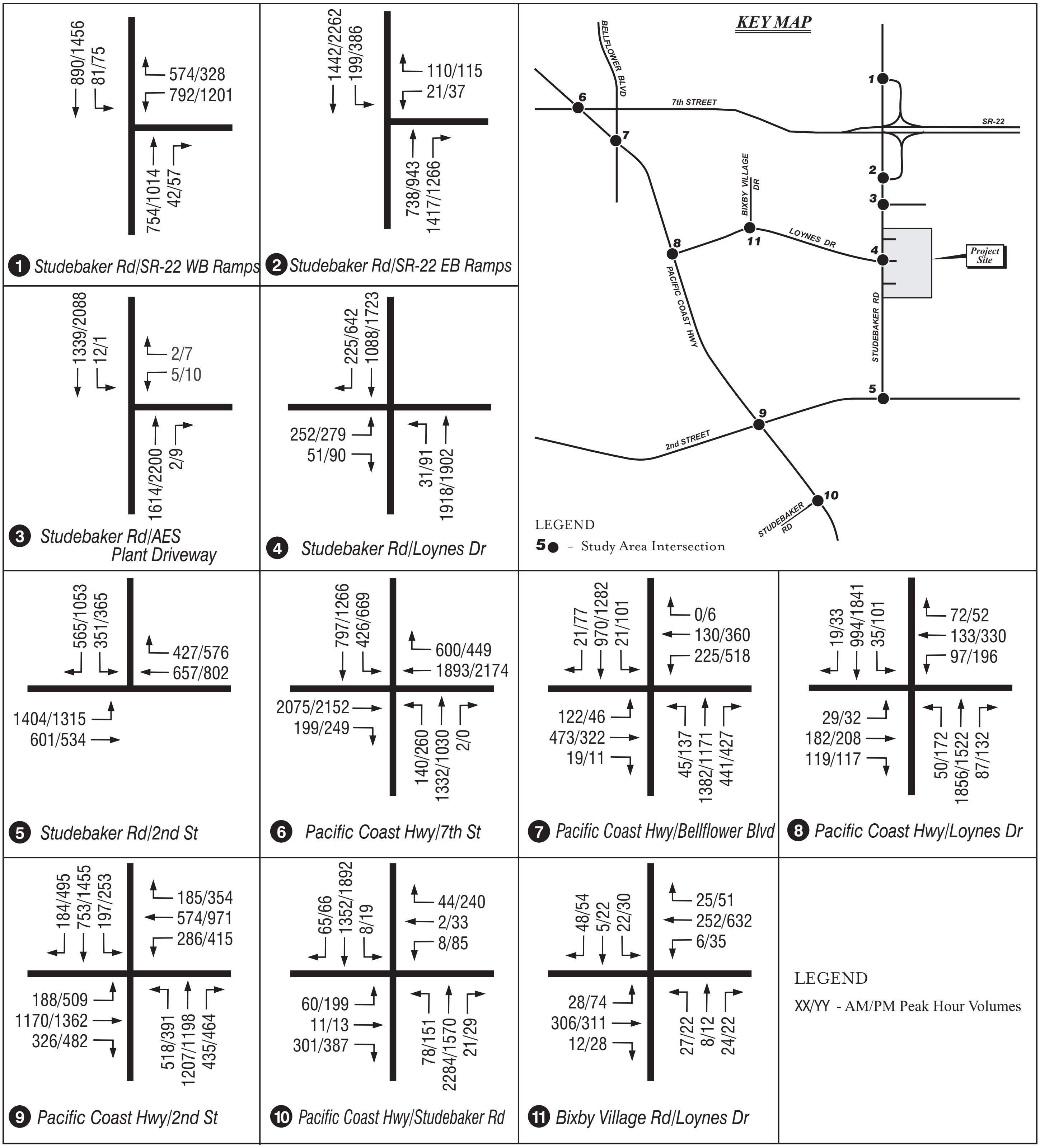

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FIGURE 7

SCHEMATIC - NOT TO SCALE

Long Beach Home Depot

Cumulative A.M. and P.M. Peak Hour Traffic Volumes

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Table C: Cumulative Baseline Intersection Level of Service Summary

Intersection		AM Peak Hour		PM Peak Hour	
		ICU	LOS	ICU	LOS
1	Studebaker Rd/SR-22 WB Ramps	0.711	C	1.022	F
2	Studebaker Rd/SR-22 EB Ramps	0.608	B	0.870	D
3	Studebaker Rd/AES Plant Driveway	0.637	B	0.819	D
4	Studebaker Rd/Loynes Rd	0.867	D	0.872	D
5	Studebaker Rd/2nd Street	0.965	E	0.984	E
6	PCH/7th Street	1.197	F	1.306	F
7	PCH/Bellflower Blvd	0.707	C	0.830	D
8	PCH/Loynes Dr	0.730	C	0.863	D
9	PCH/2nd Street	0.933	E	1.057	F
10	PCH/Studebaker Rd	0.895	D	1.319	F
11	Bixby Village Rd/Loynes Dr	0.251	A	0.413	A

Table D: Long Beach Home Depot Center Project Trip Generation Summary

				AM Peak Hour			PM Peak Hour		
Land Use	**Size**	**Units**	**ADT**	**In**	**Out**	**Total**	**In**	**Out**	**Total**
Trip Rates [1]									
Home Improvement		TSF	29.80	0.65	0.55	1.20	1.15	1.30	2.45
Shopping Center		TSF			ITE Regression Equation [2]				
Sit-Down Restaurant		TSF	127.15	5.99	5.53	11.52	6.66	4.26	10.92
Trip Generation									
Home Improvement	140.000	TSF	4,172	91	77	168	161	182	343
Shopping Center	45.000	TSF	4,041	59	38	97	212	230	442
Sit-Down Restaurant	7.000	TSF	890	42	39	81	47	30	77
Sub-Total Trip Generation			**9,103**	**192**	**154**	**346**	**420**	**442**	**862**
Pass-By Trips Reduction [3]			-1,183	-29	-23	-52	-105	-110	-215
Total Trip Generation			**7,920**	**163**	**131**	**294**	**315**	**332**	**647**

Notes:

[1] Trip Rates referenced in the Institute of Transportation Engineers, *Trip Generation,* 7th Edition (2003)

Land Use Codes: 820 (Shopping Center), 862 (Home Improvement Superstore), 932 (Sit Down Restaurant).

[2] Daily: Ln(T) = 0.65 Ln(X) + 5.83 (In/Out - 50:50)

AM Peak: Ln(T) = 0.60 Ln(X) + 2.29 (In/Out - 61:39)

PM Peak: Ln (T) = 0.66 Ln(X) + 3.40 (In/Out - 48:52)

[3] Pass-By trips are trips made as intermediate stops on the way from an origin to a primary trip destination. Pass-by trip reduction factors of 13% for daily trips, 15% for a.m. peak hour, and 25% for p.m. peak hour were referenced from "pass-by" surveys for the Huntington Beach Home Depot Store by Barton-Aschman Associates, Inc. (February 6,1996).

TSF = Thousand Square Feet

It should be noted that the pass-by trip reduction factors referenced from the ITE Handbook (October 1998) for home improvement superstore is an average of 48 percent and the pass-by reduction factors for shopping center and sit-down restaurant are 34 percent and 48 percent, respectively. Based on this, the pass-by trip reduction factors referenced in the Barton-Aschman studies represent a conservative estimate of pass-by trips for all proposed uses on site.

As the trip generation table indicates, the net trip generation for the proposed Home Depot Center is approximately 5,783 average daily trips (ADT), 239 a.m. peak-hour trips, and 422 p.m. peak-hour trips.

Project Trip Distribution and Assignment

Trip distribution for the proposed project was based on logical travel corridors and minimum time paths. Project traffic volumes for vehicles both entering and exiting the project site were distributed and assigned to the adjacent street system based on the proximity to major arterials (i.e., SR-22, PCH, Bellflower Boulevard), residential neighborhoods, and the locations of other Home Depot stores in the surrounding area. Other Home Depot stores in the vicinity of the project site are located in the Cities of Signal Hill, Lakewood, Westminster, Cypress, and Huntington Beach.

As illustrated in Figure 8, approximately 10 percent of the trips would be destined northwest via PCH; 15 percent north via Bellflower Boulevard; 20 percent north via Studebaker Road; 5 percent south via PCH; 20 percent east via SR-22 and 2nd Street; and 30 percent west via 2nd Street, Loynes Drive, and 7th Street.

The project traffic volumes were assigned to the adjacent street system based on the trip distribution percentages and net trip generation. The resulting project trip assignment is also illustrated in Figure 8. It should be noted that the trip assignment at the project driveway (Studebaker Road/Loynes Drive) includes the “pass-by” trip reduction factors that were calculated for the proposed project. LSA manually adjusted the traffic volumes entering and exiting the project site at Studebaker Road/Loynes Drive to account for the redistribution of traffic (i.e., pass-by trips) caused by the project. The negative traffic volumes shown at this intersection reflect the trips that have been diverted into the project site.

The City Transportation and Traffic Bureau staff reviewed and approved the trip generation and distribution for the project prior to the preparation of the impact analysis.

EXISTING PLUS PROJECT CONDITIONS

To determine existing plus project conditions, traffic generated by the proposed project was added to existing traffic volumes at the study area intersections. Figure 9 shows the resulting existing plus project a.m. and p.m. peak-hour traffic volumes at the study area intersections.

Table E summarizes the results of the existing plus project a.m. and p.m. peak-hour LOS analysis for all signalized study area intersections utilizing the ICU methodology. The existing plus project LOS calculation worksheets are contained in Appendix F. As this table indicates, five study area

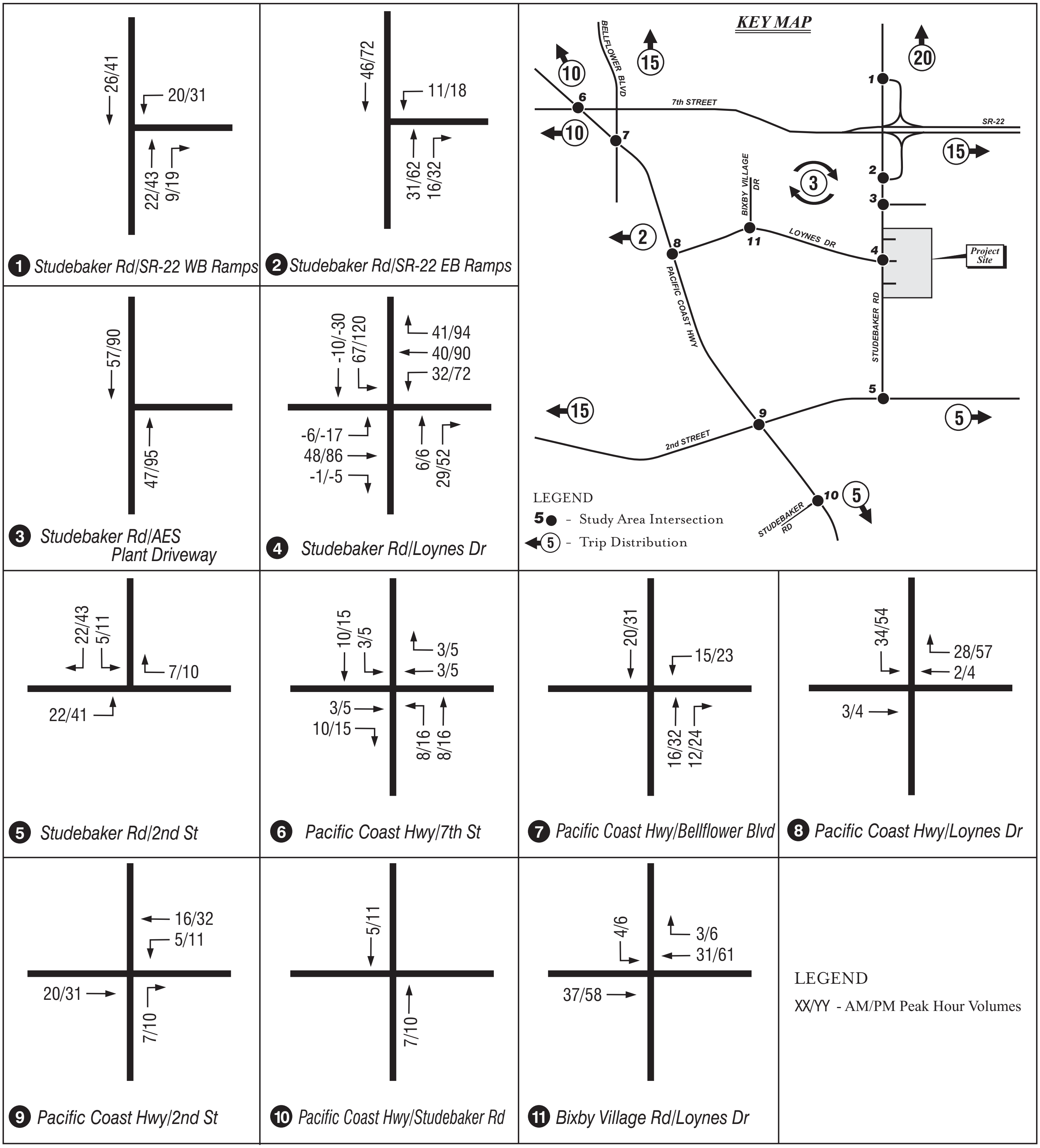

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FIGURE 8

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SCHEMATIC - NOT TO SCALE

Long Beach Home Depot

Project Trip Distribution and Assignment

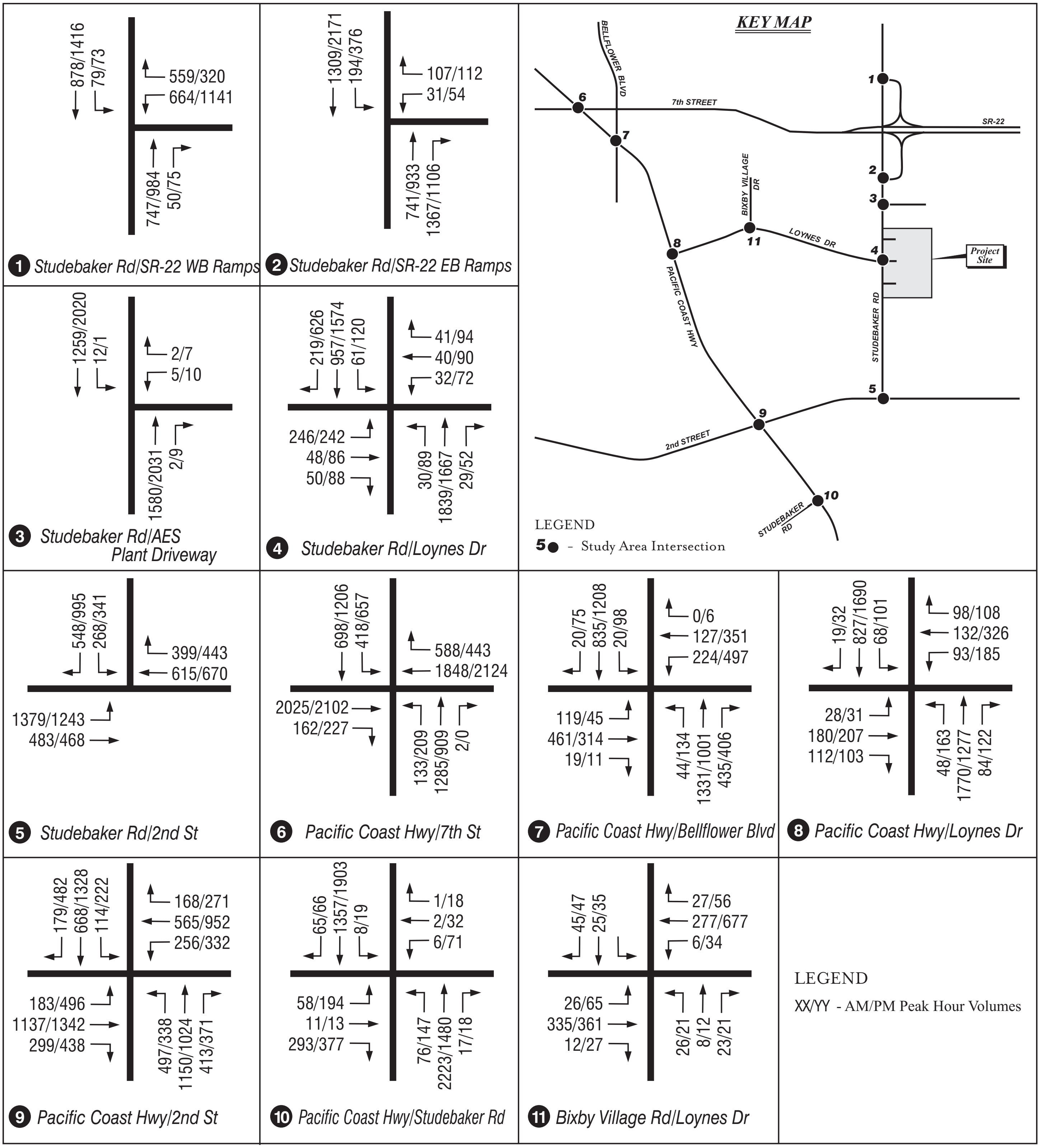

FIGURE 9

SCHEMATIC - NOT TO SCALE

Long Beach Home Depot

Existing Plus Project A.M. and P.M. Peak Hour Traffic Volumes

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Table E: Existing Plus Project Weekday Intersection Level of Service Summary

	Intersection	Existing Conditions				Existing plus Project				Increase in ICU		Exceeds City Significance Threshold	
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour					
		ICU	LOS	ICU	LOS	ICU	LOS	ICU	LOS	AM	PM	AM	PM
1	Studebaker Rd/SR-22 WB Ramps	0.650	B	0.965	E	0.663	B	0.989	E	0.013	0.024	N	Y
2	Studebaker Rd/SR-22 EB Ramps	0.552	A	0.818	D	0.570	A	0.847	D	0.018	0.029	N	N
3	Studebaker Rd/AES Plant Driveway	0.611	B	0.734	C	0.626	B	0.762	C	0.015	0.028	N	N
4	Studebaker Rd/Loynes Rd	0.807	D	0.792	C	0.685	B	0.844	D	-0.122	0.052	N	N
5	Studebaker Rd/2nd Street	0.903	D	0.891	D	0.914	E	0.909	E	0.011	0.018	Y	Y
6	PCH/7th Street (CMP)	1.167	F	1.255	F	1.171	F	1.261	F	0.004	0.006	N	N
7	PCH/Bellflower Blvd	0.683	B	0.787	C	0.692	B	0.802	D	0.009	0.015	N	N
8	PCH/Loynes Dr	0.706	C	0.815	D	0.728	C	0.816	D	0.022	0.001	N	N
9	PCH/2nd Street (CMP)	0.895	D	1.059	F	0.903	D	1.069	F	0.008	0.010	N	N
10	PCH/Studebaker Rd	0.809	D	1.144	F	0.810	D	1.148	F	0.001	0.004	N	N
11	Bixby Village Rd/Loynes Dr	0.245	A	0.401	A	0.263	A	0.425	A	0.018	0.024	N	N

Notes:

Shaded boxes represent significant impacts based on the increase of ICU from LOS D to LOS E or F, or by 0.020 or greater for LOS E or F conditions.

(CMP) Los Angeles County CMP Monitoring Intersection intersections are forecast to operate at unacceptable LOS (LOS D or worse) in the peak hours. Three intersections (PCH/7th Street, PCH/2nd Street, PCH/Studebaker Road) would continue to exceed the City's LOS standards; however, these intersections would not be significantly impacted by the project based on the City's significance criteria. Implementation of the proposed project would cause an increase of 0.020 to the ICU or cause an intersection to increase from LOS D to LOS E or LOS F at two of the intersections, as described below:

- **Studebaker Road/SR-22 westbound ramps:** Increase in LOS E ICU of 0.02 during the p.m. peak hour.
- **Studebaker Road/2nd Street:** Increase from LOS D to a LOS E during the a.m. and p.m. peak hour.

This information is for disclosure purposes only. Project impacts and mitigation measures at these locations are identified for the cumulative (project opening) condition.

CUMULATIVE (PROJECT OPENING YEAR) PLUS PROJECT CONDITIONS

To determine cumulative plus project conditions, traffic generated by the proposed project, cumulative projects, and an ambient growth factor were added to existing traffic volumes at the study area intersections. Figure 10 shows the resulting cumulative plus project a.m. and p.m. peak-hour traffic volumes at the study area intersections.

Table F summarizes the results of the cumulative plus project a.m. and p.m. peak-hour LOS analysis for all signalized study area intersections utilizing the ICU methodology. As this table indicates, six study area intersections are forecast to operate at unacceptable LOS (LOS D or worse) in the peak hours. Three intersections (PCH/2nd Street, PCH/Studebaker Road, and PCH/7th Street) would continue to exceed the City's LOS standards; however, these intersections would not be significantly impacted by the project based on the City's significance criteria. Implementation of the proposed project would cause an increase of 0.020 to the ICU at two of the intersections, as described below:

- **Studebaker Road/SR-22 westbound ramps:** increase in LOS F ICU of 0.02 during the p.m. peak hour.
- **Studebaker Road/2nd Street:** increase from LOS E to a LOS F (0.024) during the p.m. peak hour.

Improvements to offset these project impacts are discussed later in this report. The cumulative plus project LOS calculation worksheets are contained in Appendix G.

The proposed project would include project design features to the main access driveway located at Studebaker Road/Loynes Drive. The project improvements would include the installation of one westbound left-lane, one westbound through-lane, and one westbound right-lane. In addition, an additional northbound through lane, northbound right-turn lane, and southbound left-turn lane would be constructed. The existing inside eastbound right-turn lane would be converted to an eastbound through lane for vehicles entering the project site. The proposed project would include a change to

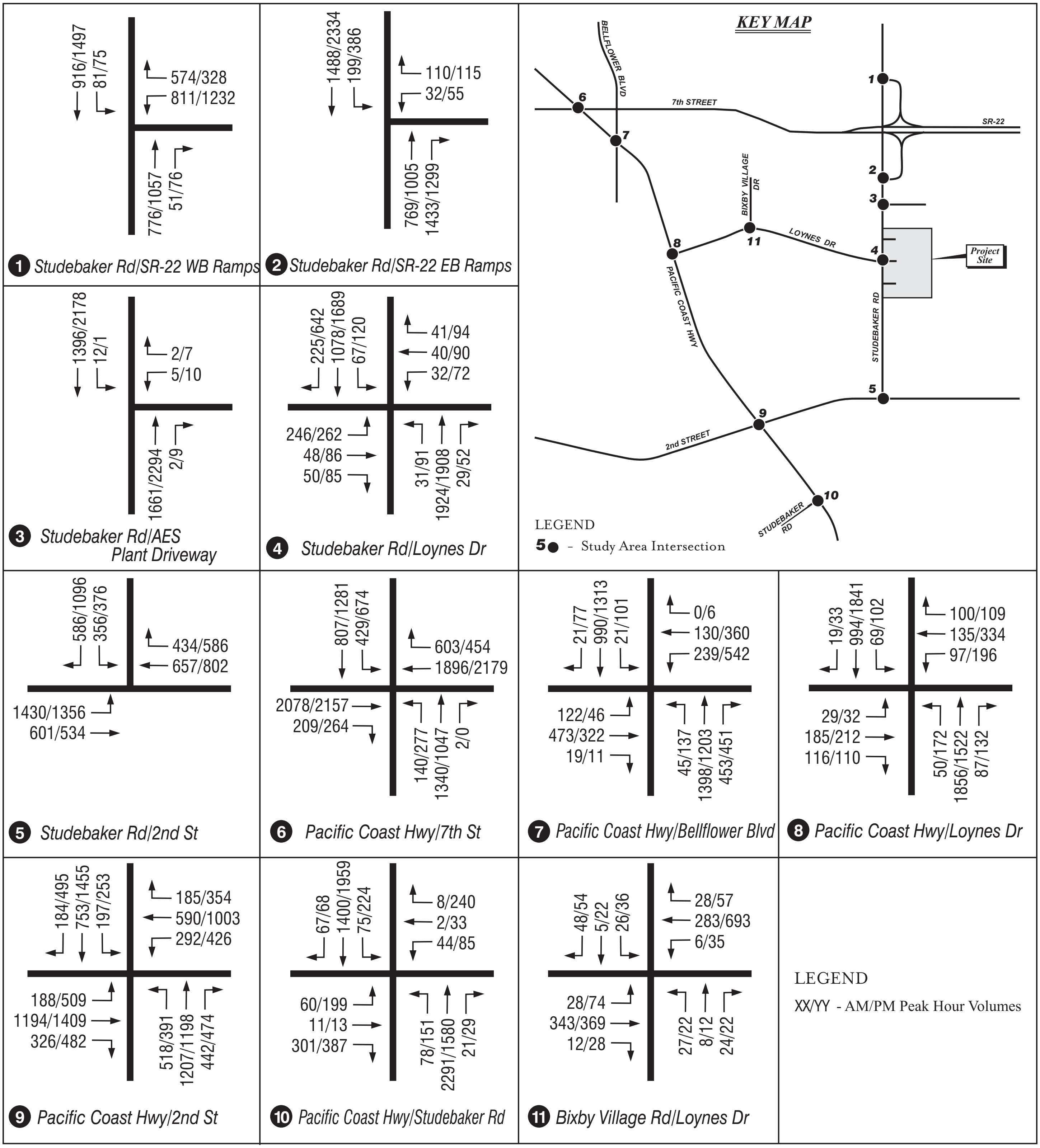

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FIGURE 10

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Long Beach Home Depot

Cumulative Plus Project
A.M. and P.M. Peak Hour Traffic Volumes

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Table F: Cumulative Plus Project Weekday Intersection Level of Service Summary

		Cumulative Conditions				Cumulative Plus Project Conditions				Increase in ICU		Exceeds City Significant Threshold	
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour					
	Intersection	ICU	LOS	ICU	LOS	ICU	LOS	ICU	LOS	AM	PM	AM	PM
1	Studebaker Rd/SR-22 WB Ramps	0.711	C	1.022	F	0.725	C	1.045	F	0.014	0.023	N	Y
2	Studebaker Rd/SR-22 EB Ramps	0.608	B	0.870	D	0.626	B	0.898	D	0.018	0.028	N	N
3	Studebaker Rd/AES Plant Driveway	0.637	B	0.819	D	0.651	B	0.849	D	0.014	0.030	N	N
4	Studebaker Rd/Loynes Rd [1]	0.867	D	0.872	D	0.673	B	0.858	D	-0.194	-0.014	N	N
5	Studebaker Rd/2nd Street	0.965	E	0.984	E	0.975	E	1.002	F	0.010	0.018	N	Y
6	PCH/7th Street (CMP)	1.197	F	1.306	F	1.201	F	1.313	F	0.004	0.007	N	N
7	PCH/Bellflower Blvd	0.707	C	0.830	D	0.715	C	0.844	D	0.008	0.014	N	N
8	PCH/Loynes Dr	0.730	C	0.863	D	0.753	C	0.864	D	0.023	0.001	N	N
9	PCH/2nd Street (CMP)	0.933	E	1.057	F	0.941	E	1.066	F	0.008	0.009	N	N
10	PCH/Studebaker Rd	0.895	D	1.319	F	0.896	D	1.322	F	0.001	0.003	N	N
11	Bixby Village Rd/Loynes Dr	0.251	A	0.413	A	0.267	A	0.438	A	0.016	0.025	N	N

Notes:

Shaded boxes represent significant impacts based on the increase of ICU by 0.020 or greater for LOS E or F conditions.

(CMP) Los Angeles County CMP Monitoring Intersection

[1] Improvements to intersection included with project design.

the traffic signal controls for the northbound and southbound left-turn movements to protected-permissive signal phasing. The proposed project would also include restriping of northbound Studebaker Road (36 feet wide) between the south driveway and the SR-22 eastbound ramps to provide three (12-foot-wide) through lanes. The third northbound through lane would terminate at the northbound right-turn lane at the SR-22 eastbound ramps.

WEEKEND MIDDAY (SATURDAY) ANALYSIS

The purpose of this traffic impact analysis is to address short-term traffic impacts during the weekday a.m. and p.m. peak hour. Furthermore, intersection and roadway improvements are typically recommended or identified to offset a project's weekday peak-hour impact and maintain acceptable levels of service throughout the typical weekday (Monday–Friday). Since the Home Depot project has the potential to generate a significant amount of traffic on the weekend, a weekend analysis was prepared.

To determine the weekend midday peak-hour, LSA conducted daily traffic counts along Studebaker Road, adjacent to the project site. Based on the weekend traffic counts, the midday peak hour was between the hours of 11:00 a.m. and 1:00 p.m. on a Saturday. In addition, LSA received sales data from the project applicant from other Home Depot stores in the County to determine the sales demand per hour during the weekend. Based on this information, the sales demand during a Saturday is consistent with the midday peak hour along Studebaker Road. Therefore, LSA assumed the midday peak hour along Studebaker Road during the hours of 11:00 a.m. and 1:00 p.m.

Weekend peak-hour (midday) traffic counts were collected in July 2004. Appendix B provides the existing weekend traffic counts. The weekend daily and peak-hour trips for the cumulative projects and the proposed Home Depot project were generated using trip rates from the ITE *Trip Generation* manual (7th Edition 2003). The trip rates for the cumulative land uses analyzed in the weekday analysis were used to calculate weekend trips generated by cumulative projects. The cumulative project trip generation is presented in Table G. The land uses utilized in the weekday analysis for the Home Depot project were used to calculate weekend trips generated by the proposed project. The trip generation estimated for the project site includes the reduction for pass-by trips. Pass-by trip reduction factors of 13 percent for daily trips and 13 percent for weekend peak-hour trips were applied to the project site. The pass-by trip reduction factors were based on pass-by surveys conducted by Barton-Aschman Associates, Inc. (previously mentioned in the Weekday Trip Generation). The project weekend trip generation is presented in Table H.

The project traffic volumes were assigned to the adjacent street system based on the trip distribution percentages previously mentioned, and the net weekend trip generation. The trip assignment at the study area intersections include the pass-by trip reduction factors that were calculated for the proposed project. LSA manually adjusted the traffic volumes entering and exiting the project site at Studebaker Road/Loynes Drive to reflect the redistribution of traffic (i.e., pass-by trips) caused by the project. Figures 11, 12, 13, and 14 illustrate the existing, cumulative, existing plus project, and cumulative plus project weekend traffic volumes at all study area intersections, respectively.

Table G: Approved/Pending Projects Weekend Trip Generation Summary

Land Use	Size	Units	ADT	Weekend Peak Hour In	Weekend Peak Hour Out	Weekend Peak Hour Total
1. 120 Studebaker						
Shopping Center						
Trip Rate		TSF	ITE Regression Equation [2]			
Trip Generation	60.650	TSF	6,743	325	300	625
2. Boeing Specific Plan (Pacific Gateway Center)						
Existing Uses to Remain in PA 1			1,908	178	152	330
Planning Area 1						
Light Industrial						
Trip Rate		TSF	1.32	0.07	0.07	0.14
Trip Generation	345.000	TSF	455	23	26	48
Planning Area 2						
Light Industrial	345.000	TSF	455	23	26	48
Trip Credits			-311	-26	-24	-50
Net Trip Generation PA 2			**145**	**-4**	**2**	**-2**
Planning Area 3						
Light Industrial			912	45	51	97
Planning Area 4						
Hotel	120	Rooms	872	45	30	75
Shopping Center	12.500	TSF	2,493	116	108	224
Quality Restaurant	10.000	TSF	944	64	44	108
High-Turnover Restaurant	10.000	TSF	1,584	126	74	200
			5,893	351	256	607
Pass-By Adjustment				-113	-79	-192
Net Trip Generation PA 4			**5,893**	**238**	**177**	**415**
Total Trip Generation [3]			9,313	481	407	888
Total Cumulative Trip Generation			**16,056**	**806**	**707**	**1,514**

Notes:

[1] Trip Rates referenced in the Institute of Transportation Engineers, *Trip Generation*, 7th Edition (2003)

Land Use Code: 820 (Shopping Center)

[2] Daily: Ln(T) = 0.65 Ln(X) + 5.83 (In/Out - 50:50)

AM Peak: Ln(T) = 0.60 Ln(X) + 2.29 (In/Out - 61:39)

PM Peak: Ln (T) = 0.66 Ln(X) + 3.40 (In/Out - 48:52)

TSF = Thousand Square Feet

Table H: Long Beach Home Depot Center Project Weekend Trip Generation Summary

Land Use	Size	Units	ADT	Weekend Peak Hour In	Out	Total
Trip Rates [1]						
Home Improvement		TSF	45.67	2.86	2.54	5.40
Shopping Center		TSF	ITE Regression Equation [2]			
Sit-Down Restaurant		TSF	158.37	12.60	7.40	20.00
Trip Generation						
Home Improvement	140.000	TSF	6,394	401	355	756
Shopping Center	12.000	TSF	2,430	113	105	218
Sit-Down Restaurant	6.000	TSF	950	76	44	120
Sub-Total Trip Generation			**9,774**	**590**	**504**	**1,094**
Pass-By Trips Reduction [3]			-1,271	-77	-66	-142
Total Trip Generation			**8,503**	**513**	**439**	**952**

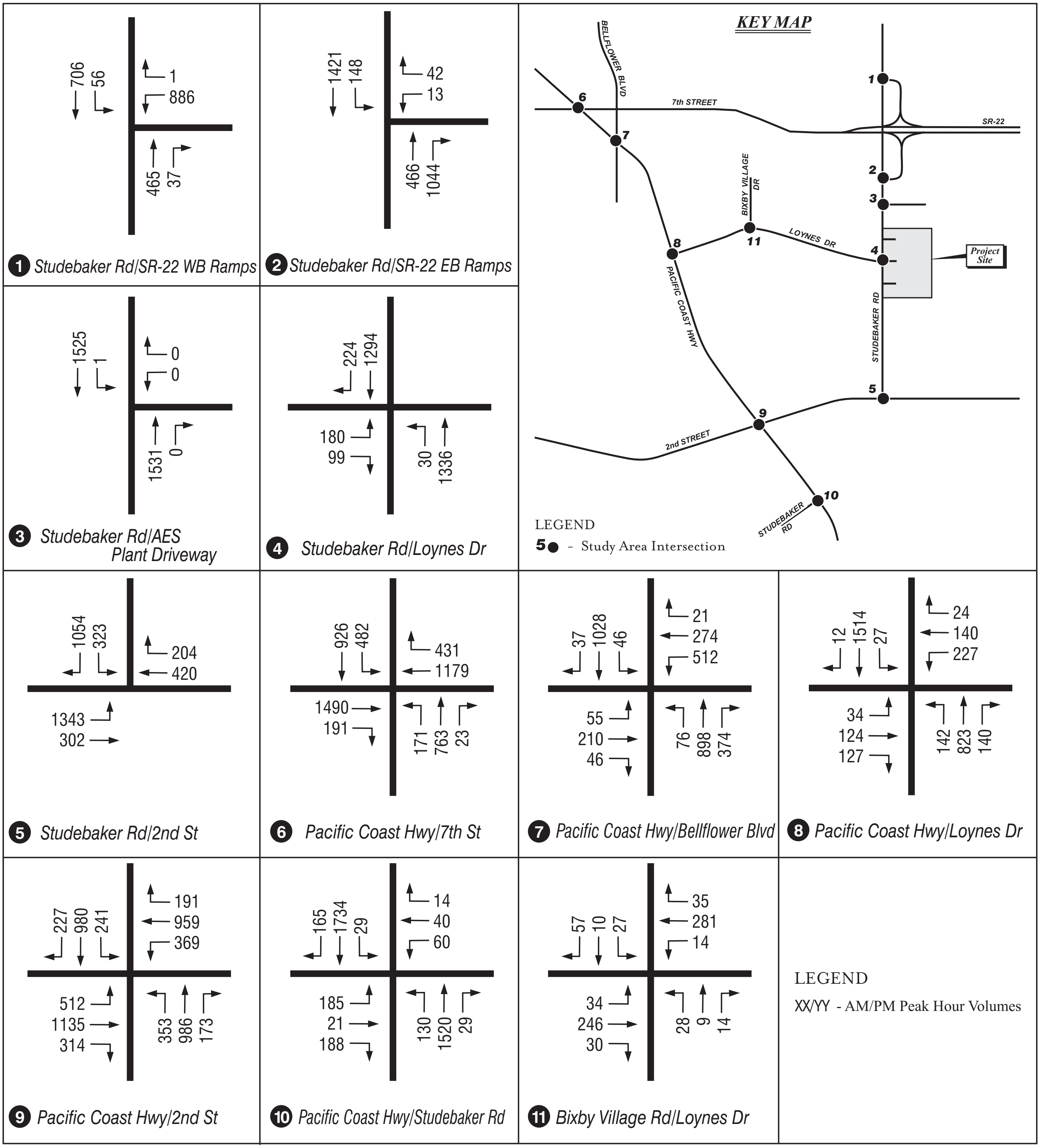
Notes:

[1] Trip Rates referenced in the Institute of Transportation Engineers, *Trip Generation*, 7th Edition (2003)
Land Use Codes: 820 (Shopping Center), 862 (Home Improvement Superstore), 932 (Sit Down Restaurant).

[2] Daily: $Ln(T) = 0.63\ Ln(X) + 6.23$ (In/Out - 50:50)
Weekend Peak: $Ln(T) = 0.65\ Ln(X) + 3.77$ (In/Out - 52:48)

[3] Pass-By trips are trips made as intermediate stops on the way from an origin to a primary trip destination. Pass-by trip reduction factors of 13% for daily trips, 13% for weekend peak hour were referenced from "pass-by" surveys for the Huntington Beach Home Depot Store by Barton-Aschman Associates, Inc. (February 6,1996).

TSF = Thousand Square Feet



LSA

FIGURE 11

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SCHEMATIC - NOT TO SCALE

Long Beach Home Depot

Existing Weekend (Saturday) Traffic Volumes

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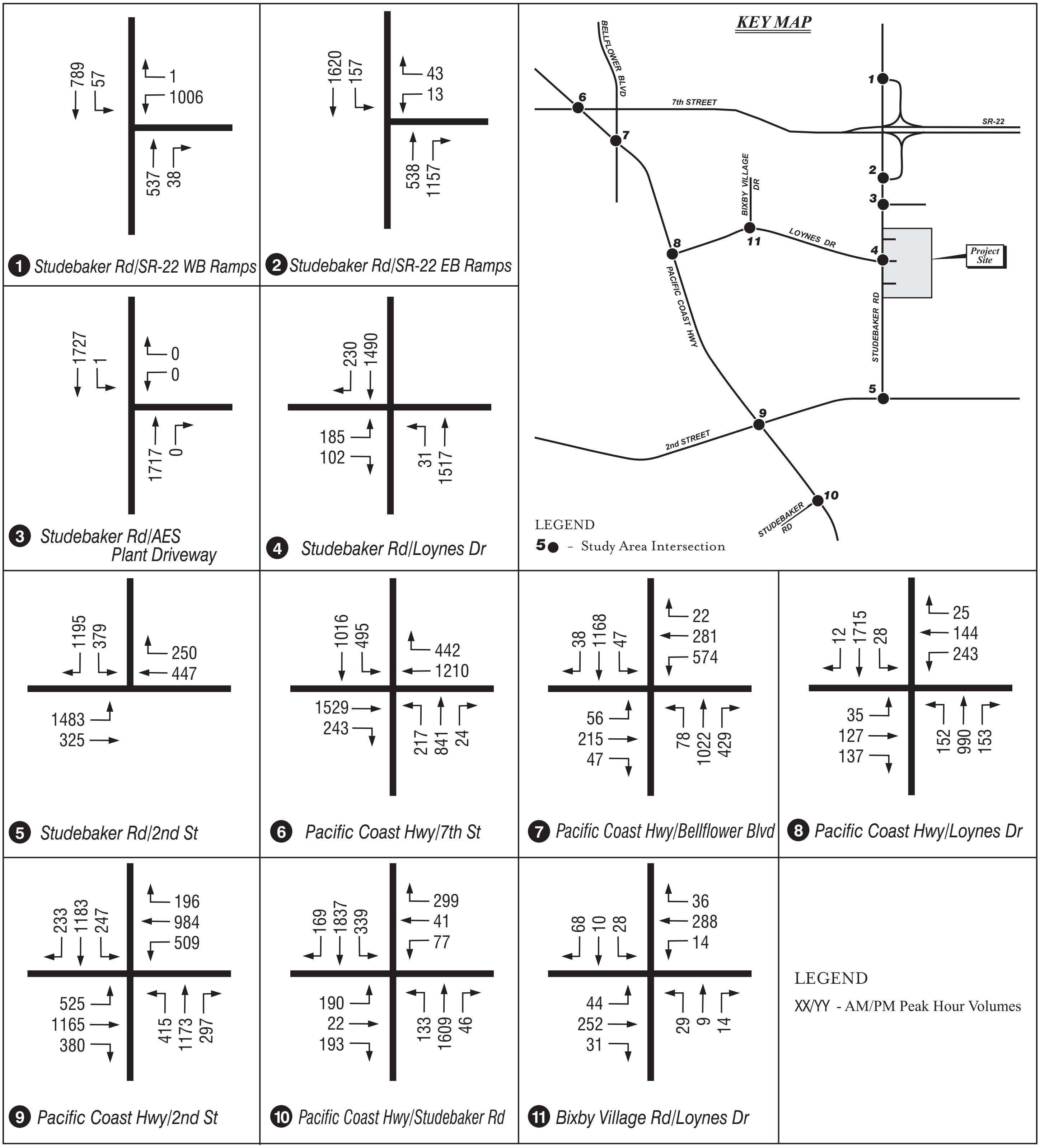


LSA

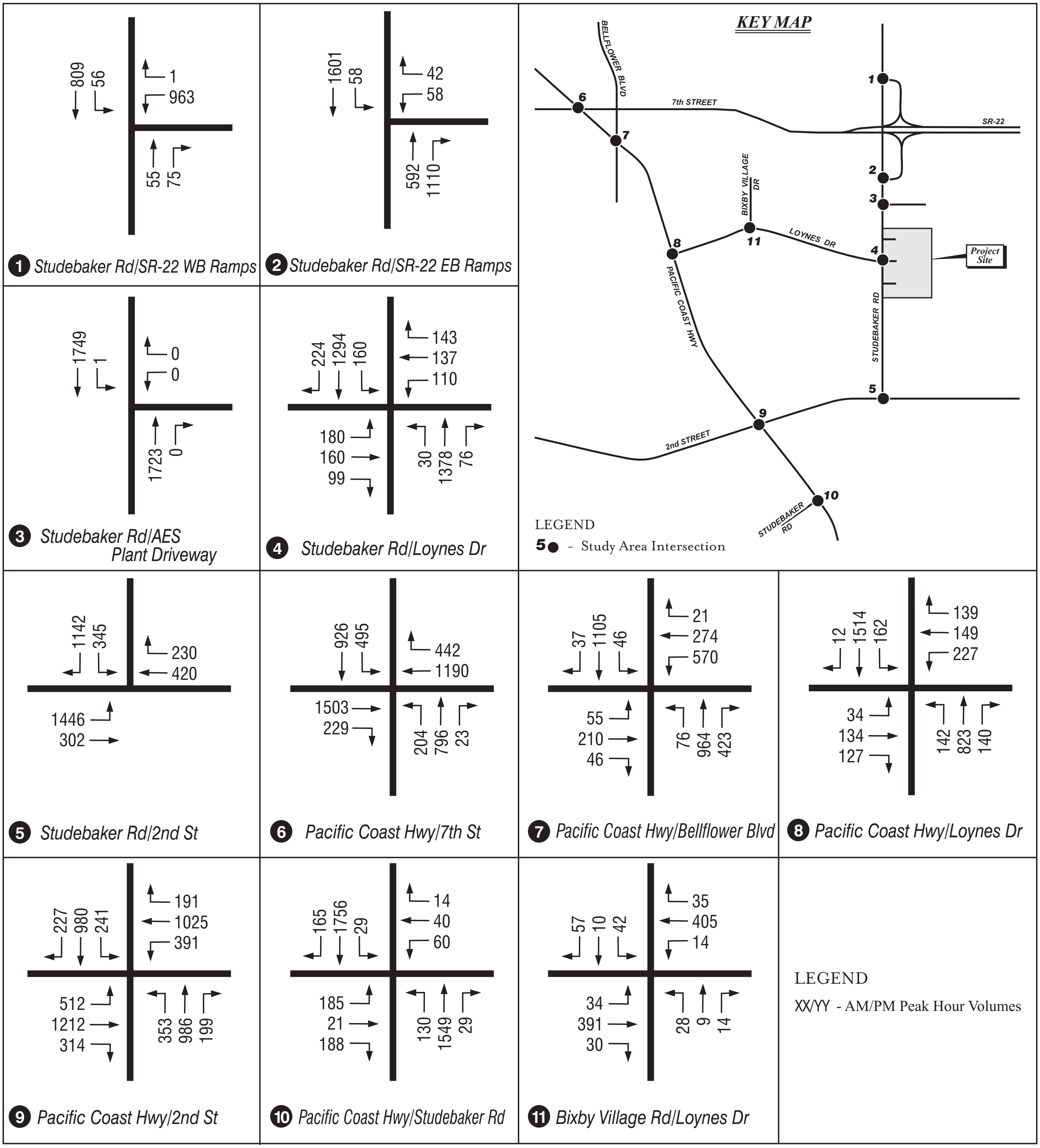
FIGURE 12

N

SCHEMATIC - NOT TO SCALE

Long Beach Home Depot

Cumulative Weekend (Saturday) Traffic Volumes



LSA

FIGURE 13

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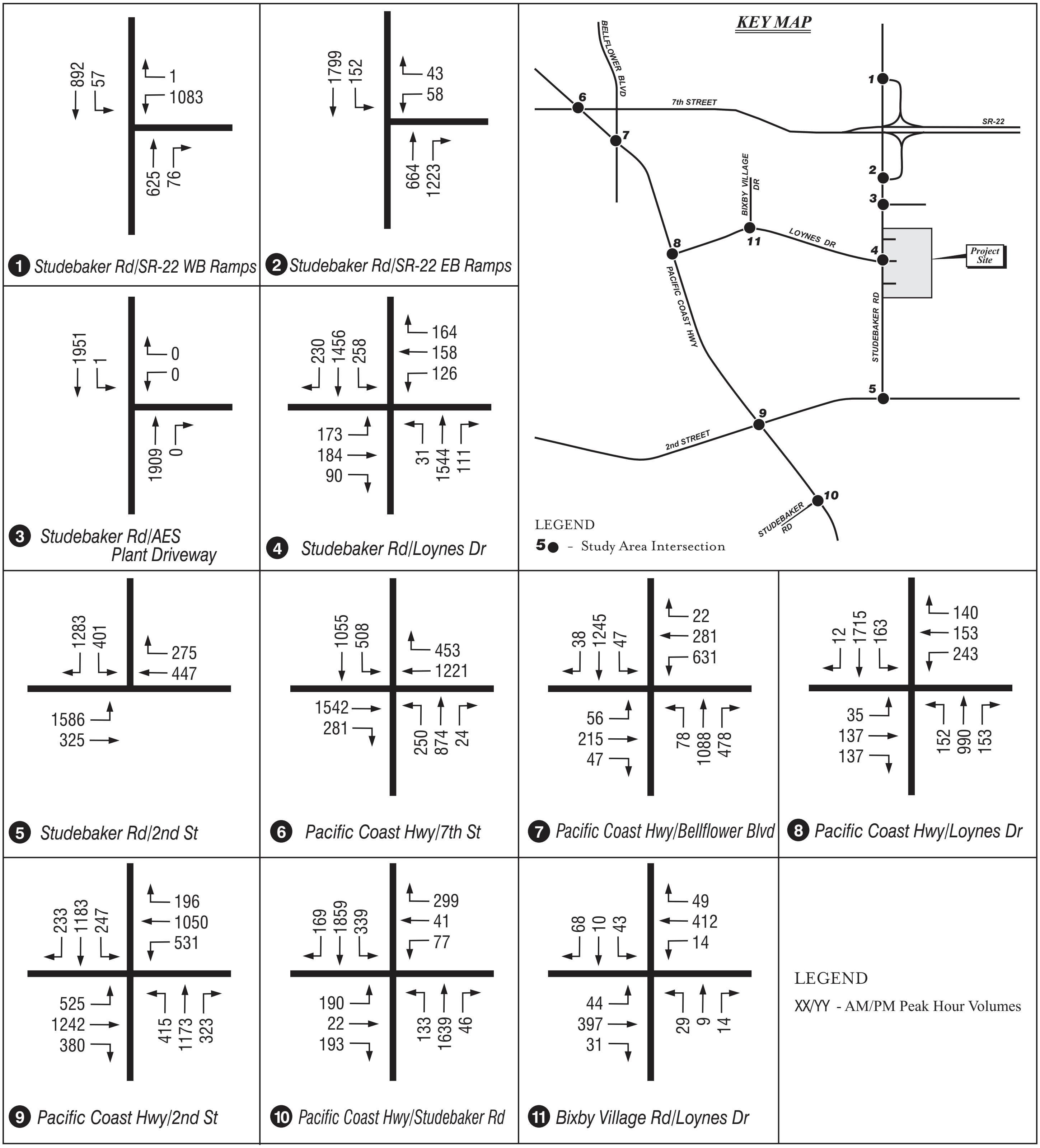
Long Beach Home Depot

SCHEMATIC - NOT TO SCALE

Existing Weekend (Saturday) Plus Project Traffic Volumes

I:\CLB430\G\Traffic\Ex Weekend+Proj Vols.cdr (3/28/05)



LSA

Note: Volumes on Studebaker Road/Loynes Drive do not include the PPLT reduction.

FIGURE 14

N

Long Beach Home Depot

Cumulative Plus Project
Weekend (Saturday) Traffic Volumes

SCHEMATIC - NOT TO SCALE

I:\CLB430\G\Traffic\Cumulative+Proj Weekend Vols.cdr (1/14/05)

Table I summarizes the results of the weekend midday peak hour levels of service at the 11 study area intersections during the existing, cumulative (2006), existing plus project, and cumulative (2006) plus project conditions. It should be noted that the City does not provide a significance threshold for a weekend analysis. For purposes of this weekend analysis, LSA used the 0.020 significance threshold that is typically used during a weekday analysis.

As shown in the table, two study area intersections currently operate at unsatisfactory (LOS E or worse) conditions. Four study area intersections are forecast to operate at unsatisfactory levels of service (LOS E or worse) in the cumulative (2006) condition. With the implementation of the proposed project, four study area intersections would continue to operate at unsatisfactory levels of service (LOS E or worse). Implementation of the proposed project would cause an increase of 0.020 to the ICU at three of the intersections, as described below. The existing, existing plus project, cumulative, and cumulative plus project weekend LOS calculation worksheets are presented in Appendix H.

- **PCH/7th Street:** increase in LOS E ICU of 0.028 during the weekend midday peak-hour
- **PCH/2nd Street:** increase in LOS F ICU of 0.029 during the weekend midday peak-hour
- **Studebaker Road/2nd Street:** increase in LOS E ICU of 0.044 during the weekend midday peak hour

Improvements to offset these weekend impacts are discussed later in this report.

CONGESTION MANAGEMENT PROGRAM ANALYSIS

The CMP requires new development projects to analyze potential impacts on CMP monitoring locations. Based on the 2002 CMP for Los Angeles County, the following arterial monitoring stations are located within the proposed project area:

- PCH/7th Street
- PCH/2nd Street

Traffic Impact Analysis

Per the CMP Traffic Impact Analysis Guidelines, a traffic impact analysis must be conducted where:

- The proposed project will add 50 or more trips at CMP arterial monitoring intersections during the a.m. and p.m. weekday peak hours.
- The proposed project will add 150 or more trips, in either direction, at CMP mainline monitoring locations during the a.m. or p.m. weekday peak hours.

Since the two CMP intersections are included as study area intersections for the proposed project, the impact analysis at these locations is discussed throughout this report. Table J summarizes the results of the existing, cumulative, existing plus project, and cumulative plus project LOS analysis at the two

Table I: Existing, Cumulative, Existing Plus Project, and Cumulative Plus Project Weekend Intersection Level of Service Summary

	Intersection	Existing Weekend Conditions		Existing Weekend Plus Project Conditions		Exceeds City Significance Threshold	Cumulative Weekend Conditions		Cumulative Weekend Plus Project Conditions		Exceeds City Significance Threshold
		Weekend Peak Hour		Weekend Peak Hour			Weekend Peak Hour		Weekend Peak Hour		
		ICU	LOS	ICU	LOS		ICU	LOS	ICU	LOS	
1	Studebaker Rd/SR-22 WB Ramps	0.678	B	0.737	C	N	0.746	C	0.805	D	N
2	Studebaker Rd/SR-22 EB Ramps	0.594	A	0.670	B	N	0.656	B	0.732	C	N
3	Studebaker Rd/AES Plant Driveway	0.597	A	0.667	B	N	0.660	B	0.730	C	N
4	Studebaker Rd/Loynes Rd [1]	0.636	B	0.756	C	N	0.729	C	0.809	D	N
5	Studebaker Rd/2nd Street	0.860	D	0.903	D	N	0.936	E	0.980	E	Y
6	PCH/7th Street (CMP)	0.880	D	0.894	D	N	0.910	E	0.938	E	Y
7	PCH/Bellflower Blvd	0.693	B	0.737	C	N	0.744	C	0.795	C	N
8	PCH/Loynes Dr	0.774	C	0.778	C	N	0.840	D	0.840	D	N
9	PCH/2nd Street (CMP)	0.950	E	0.969	E	N	0.991	E	1.020	F	Y
10	PCH/Studebaker Rd	0.962	E	0.969	E	N	1.189	F	1.195	F	N
11	Bixby Village Rd/Loynes Dr	0.273	A	0.321	A	N	0.290	A	0.331	A	N

Notes:

Shaded boxes represent significant impacts based on the increase of ICU from LOS D to LOS E or F, or by 0.020 or greater for LOS E or F conditions.

(CMP) Los Angeles County CMP Monitoring Intersection

[1] Improvements to intersection included with project design.

Table J: CMP Intersection Level of Service Summary

	AM Peak Hour		PM Peak Hour	
Intersection	**ICU**	**LOS**	**ICU**	**LOS**
PCH/7th Street				
- Exisiting Conditions	1.167	F	1.255	F
- Cumulative Conditions	1.197	F	1.306	F
- Existing Plus Project Conditions	1.171	F	1.261	F
- Cumulative Plus Project Conditions	1.202	F	1.317	F
PCH/2nd Street				
- Exisiting Conditions	0.895	D	1.059	F
- Cumulative Conditions	0.933	E	1.057	F
- Existing Plus Project Conditions	0.903	D	1.069	F
- Cumulative Plus Project Conditions	0.942	E	1.070	F

CMP intersections. As shown in the table, both CMP intersections operate at unsatisfactory levels of service in the a.m. and p.m. peak hours during the cumulative baseline condition. However, the proposed project does not significantly impact the CMP intersections by 2 percent of the capacity (ICU $\geq$ 0.02). Therefore, mitigation is not required at these CMP facilities.

The nearest freeway monitoring stations to the project site are along the I-405 and I-605 freeways. Based on project trip distribution percentages, approximately 15 percent of project traffic will access SR-22. Fifteen percent of peak-hour trip generation is 44 a.m. peak-hour trips and 97 p.m. peak-hour trips. As this is less than the 150-trip threshold, additional traffic impact analyses at the freeway monitoring stations are not required per the CMP.

Transit Impact Review

As required by the 2002 Los Angeles County CMP, LSA reviewed existing transit services within the project area. As previously discussed, two OCTA bus routes (Routes 1 and 60) exist along Studebaker Road. Based on the 2002 CMP Transit Monitoring Network (Figure 3-2 in the LA CMP), there are no CMP transit routes within the project site.

To estimate transit trip generation for the project, the project trip generation (Table D) was adjusted by the values set forth in the CMP (i.e., person trips equal 1.4 times vehicle trips, and transit trips equal 3.5 percent of total person trips). Based on this methodology, the proposed project is forecast to generate approximately 446 daily transit trips, 17 a.m. peak-hour transit trips (9 inbound and 8 outbound), and 43 p.m. peak-hour transit trips (21 inbound and 22 outbound).

It is anticipated that the existing transit services within the project area would be able to accommodate the project-generated transit trips. As stated previously, the project site is currently serviced by OCTA's transit service, which includes bus stops (Routes 1 and 60) located along northbound and southbound Studebaker Road adjacent to the intersection of Studebaker Road/Loynes Drive. Long Beach Transit (LBT), however, does not provide service adjacent to the project site. LSA contacted Long Beach Transit to determine whether new bus routes and/or bus stops along Studebaker Road and Loynes Drive would be provided for future transit patrons. Due to the estimated patronage, Long Beach Transit does not anticipate providing new service adjacent to the project site. If the project is constructed, Long Beach Transit will study the area and determine whether additional transit service is necessary.

CALIFORNIA DEPARTMENT OF TRANSPORTATION METHODOLOGY

Consistent with the Caltrans Guide for the Preparation of Traffic Impact Studies, intersection levels of service at seven State facilities were analyzed using the HCM 2000 methodology for the existing, cumulative, and cumulative plus project conditions. The following study area intersections were included in this analysis:

- Studebaker Road/SR-22 westbound ramps
- Studebaker Road/SR-22 eastbound ramps
- PCH/7th Street

- PCH/Bellflower Boulevard
- PCH/Loynes Drive
- PCH/2nd Street
- PCH/Studebaker Road

Table K summarizes the results of the existing, cumulative, existing plus project, and cumulative plus project weekday a.m. and p.m. peak-hour LOS and weekend midday LOS analysis for the signalized intersections identified above utilizing the HCM methodology. Based on the Caltrans methodology, two intersections are forecast to operate at unsatisfactory LOS during the weekday p.m. peak hour in the cumulative baseline condition. With implementation of the proposed project, these intersections would continue to operate at unacceptable levels of service. The project would add less than 5 seconds of overall control delay to these intersections. In addition, the weekend LOS analysis forecasted all intersections to operate at acceptable LOS, with the exception of the PCH/Studebaker Road intersection. With the implementation of the proposed project, this intersection would continue to operate at an unacceptable LOS. However, the project would add approximately 1.5 seconds to the delay. The project would create no new impact based on this methodology. It should be noted that project-impacted intersections analyzed under the ICU methodology operate at acceptable LOS using the HCM methodology. The intersection of Studebaker Road/SR-22 westbound ramps operates at LOS C (27.5 seconds) utilizing the HCM methodology, compared to a LOS F (1.045 ICU) during the p.m. peak hour. Furthermore, during the weekend period, the intersections of PCH/7th Street and PCH/2nd Street are impacted by the project using the ICU methodology. Based on the HCM methodology, however, these project-impacted intersections operate at satisfactory levels of service. The existing, cumulative, and cumulative plus project LOS calculation worksheets, utilizing the HCM methodology, are contained in Appendix I.

ON-SITE CIRCULATION AND ACCESS ANALYSIS

Site Access

LSA evaluated the operation of the ingress and egress locations of the project site along Studebaker Road. As illustrated in the project site plan (Figure 2), access to the proposed project would be provided via two right-turn in/out access driveways on Studebaker Road and at the signalized intersection of Studebaker Road/Loynes Drive. The following presents a detailed discussion of each project access. Figure 15 illustrates the projected traffic volumes at the access driveways on site.

Studebaker Road/Loynes Drive Driveway. With implementation of the proposed project, improvements at the intersection of Studebaker Road/Loynes Drive would be provided to accommodate the projected turn movements and traffic volumes. Based on the traffic volumes entering the project site, approximately 67 a.m. and 120 p.m. peak-hour vehicles would access the site via the southbound left-turn movement at the signalized intersection. Currently, a 13-foot-wide center median exists from the intersection to the Los Cerritos Channel bridge along Studebaker Road, approximately 240 feet in length.

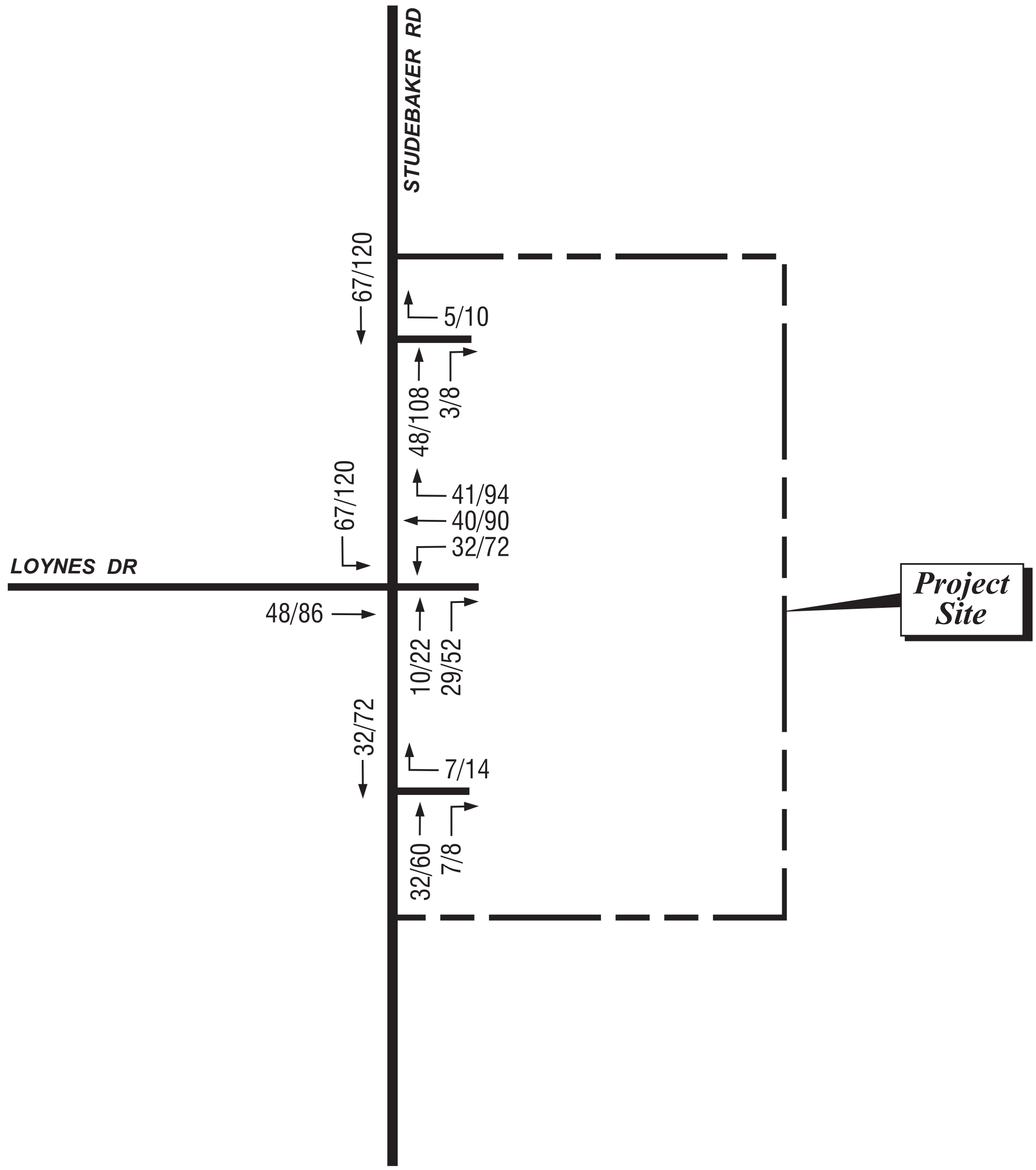
Table K: Caltrans Methodology Intersection Level of Service Summary (HCM Methodology)

WEEKDAY CONDITIONS

Intersection	Existing Conditions				Existing Plus Project Conditions				Cumulative Conditions				Cumulative Plus Project Conditions			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
Studebaker Rd/SR-22 WB Ramps	11.9	B	21.7	C	12.2	B	23.2	C	13.7	B	25.6	C	14.0	B	27.5	C
Studebaker Rd/SR-22 EB Ramps	5.8	A	8.9	A	6.1	A	9.6	A	5.9	A	9.6	A	6.2	A	10.5	B
PCH/7th Street	48.3	D	66.5	E	49.1	D	69.4	E	53.9	D	84.7	F	54.7	D	87.8	F
PCH/Bellflower Blvd	16.1	B	21.4	C	16.4	B	22.2	C	16.9	B	23.3	C	17.1	B	24.3	C
PCH/Loynes Dr	12.4	B	18.6	B	13.4	B	19.5	B	15.8	B	23.8	C	17.7	B	24.9	C
PCH/2nd Street	28.9	C	49.8	D	29.4	C	51.1	D	31.2	C	50.5	D	31.8	C	51.9	D
PCH/Studebaker Rd	15.2	B	46.2	D	15.2	B	46.6	D	25.7	C	108.3	F	25.8	C	109.0	F

WEEKEND CONDITIONS

Intersection	Existing Conditions		Existing Plus Project Conditions		Cumulative Conditions		Cumulative Plus Project Conditions	
	Mid-Day Peak Hour		Mid-Day Peak Hour		Mid-Day Peak Hour		Mid-Day Peak Hour	
	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
Studebaker Rd/SR-22 WB Ramps	12.3	B	13.7	B	13.9	B	15.6	B
Studebaker Rd/SR-22 EB Ramps	4.6	A	6.2	A	4.8	A	6.5	A
PCH/7th Street	24.7	C	26.7	C	28.3	C	30.9	C
PCH/Bellflower Blvd	17.7	B	19.0	B	19.5	B	21.0	C
PCH/Loynes Dr	18.7	B	20.4	C	23.3	C	25.3	C
PCH/2nd Street	36.1	D	38.6	D	39.6	D	42.5	D
PCH/Studebaker Rd	20.5	C	20.8	C	75.5	E	76.9	E



LSA

FIGURE 15

LEGEND

XX/YY - AM/PM Peak Hour Volumes

N

SCHEMATIC - NOT TO SCALE

Long Beach Home Depot

Project Driveway Volumes

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With implementation of the proposed project, the following improvements would be made at this intersection.

- A southbound left-turn lane would be constructed at this intersection to provide access into the project site. Based on the distance from the intersection to the bridge, approximately 240 feet is available for the construction of a southbound left-turn lane. To accommodate vehicles entering the site, it is recommended that the southbound left-turn pocket be constructed to approximately 150 feet in length with a 90-foot transition. Therefore, the transition should start immediately after the bridge to provide maximum storage for the southbound left-turn lane.
- The eastbound approach along Loynes Drive provides dual left-turn lanes and dual right-turn lanes. With the implementation of the proposed project, the dual left-turn lanes would be maintained at the intersection, and the inside right-turn lane would be converted to a through lane into the project site. The cumulative plus project eastbound right-turn traffic volumes (50 a.m. and 85 p.m. peak hours) do not warrant dual right-turn lanes. In addition, the cumulative weekend plus project eastbound right-turn traffic volume is approximately 90 midday peak-hour vehicles. This volume is greater than the p.m. peak hour; however, the volume still does not warrant dual right-turn lanes.
- The proposed project would construct one westbound left-turn lane, one westbound through lane, and one westbound right-turn lane to accommodate the project traffic demand.
- The proposed project would construct an additional northbound through-lane and a northbound dedicated right-turn lane at the intersection of Studebaker Road/Loynes Drive.
- The northbound and southbound left-turn traffic signals would be modified to allow for protected-permissive phasing. The change in signal phasing will allow northbound and southbound left-turn vehicles to turn left during the permissive (yellow) phase.

North Driveway on Studebaker Road. Currently, a gated right-turn in/out driveway is located along Studebaker Road approximately 210 feet north of the signalized intersection and approximately 8 feet south of the Los Cerritos Channel. With the implementation of the proposed project, this driveway would be maintained to provide direct access to the retail pad located in the northeast portion of the site. The maximum peak-hour volumes at this driveway are approximately 5 p.m. peak-hour inbound vehicles and 10 p.m. peak-hour outbound vehicles. It is anticipated that the north driveway would be accessed by vehicles and delivery trucks that are destined for the retail pad only. Northbound vehicles on Studebaker Road would pass two project driveways before entering this location. Therefore, this driveway is not anticipated to experience a high inbound demand.

South Driveway on Studebaker Road. With the implementation of the proposed project, an additional right turn in/out driveway would be constructed approximately 340 feet south of the intersection of Studebaker Road/Loynes Drive and 10 feet north of the Los Cerritos Channel. The maximum peak-hour volume at this driveway is approximately 5 p.m. peak-hour inbound vehicles and 10 p.m. peak-hour outbound vehicles. It is anticipated that the south driveway would be primarily used by vehicles that are destined to the restaurant and retail use located on the southwest corner of the site.

Internal Circulation

According to the City Zoning Code, the minimum width for internal driveway aisles is 24 feet. The proposed project provides driveway aisles of 24 feet or greater throughout the project site. Therefore, the proposed driveway aisles are designed to City standards. In addition, all proposed driveway widths and parking stall widths satisfy the City's minimum requirements.

The project site plan was analyzed using vehicle turning templates from the ITE, utilizing a large passenger car and large semi-trailer (ASSHTO P and WB-50) design vehicle, to ensure that vehicles and large trucks can access and circulate through the project site. Based on this, all drive aisles throughout the project site would provide adequate turning radii for passenger vehicles and large trucks. Therefore, adequate internal circulation would be provided to accommodate passenger vehicles and delivery trucks accessing the project site.

Parking Requirements

The City's minimum parking requirement for a commercial shopping center (Home Depot and retail pads) is 5 spaces per 1,000 square feet, with an additional 2 spaces per 1,000 square feet for the garden center. The minimum requirement for detached fast-food restaurant uses is 10 spaces per 1,000 square feet. Although the proposed project includes a sit-down non-fast-food restaurant (five parking spaces per 1,000 square feet), the larger requirement was used as a worst-case scenario. Based on the project site plan, approximately 585 parking spaces would be required for the shopping center, 70 parking spaces would be required for the garden center, and 60 parking spaces would be required for the restaurant, for a total of 715 required parking spaces. The proposed project would provide 742 total parking spaces on site. Therefore, the proposed project would provide parking on site that exceeds the City's requirements.

SPECIAL ISSUES

Neighborhood Street Analysis

City staff expressed concern that project traffic might utilize the residential streets within the University Park Estates neighborhood located west of the project site as a means to access the property. Staff suggested that with the implementation of the proposed project, project traffic could potentially "cut-through" the neighborhood from 7th Street to access the project site at Studebaker Road and Loynes Drive. Based on this concern, a qualitative analysis was performed to address this issue as it pertains to the residential streets at the University Park Estates.

Access to the University Park Estates neighborhood along 7th Street is provided via a signalized intersection at East Campus Road/Margo Avenue and a right-turn in/out access at Silvera Avenue. Vehicles traveling eastbound along 7th Street could potentially cut-through the neighborhood via East Campus Road/Margo Avenue, travel through Margo Avenue and make a left turn on East Vista Street, followed by a left-turn onto Loynes Drive, and continue east to the project driveway at Studebaker Road. Another potential cut-through route could be via the right-turn in/out access at Silvera Avenue, continuing south to East Vista Street, followed by a left-turn at Loynes Drive and continuing east to the project driveway at Studebaker Road. In addition, traffic originating from the project site with a destination to 7th Street, has the potential to cut-through the neighborhood along East Vista Street and Margo Avenue, continuing to the traffic signal at 7th Street.

Although it has been suggested that project traffic could potentially cut-through this neighborhood, it does not seem to be a reasonable or faster route to the proposed Home Depot site. As illustrated in Figure 16, vehicles traveling through the neighborhood via Margo Avenue would be traveling at a typical speed of 25 miles per hour (mph) and would have to stop at approximately five stop-controlled intersections before turning on to Loynes Drive. In addition, vehicles traveling through the neighborhood via Silvera Avenue would have to stop at four stop-controlled intersections before turning on to Loynes Drive. Based on the number of stop-controlled intersections and the typical speed limit for residential areas (25 mph), the cut-through route would not reduce travel time to the project site.

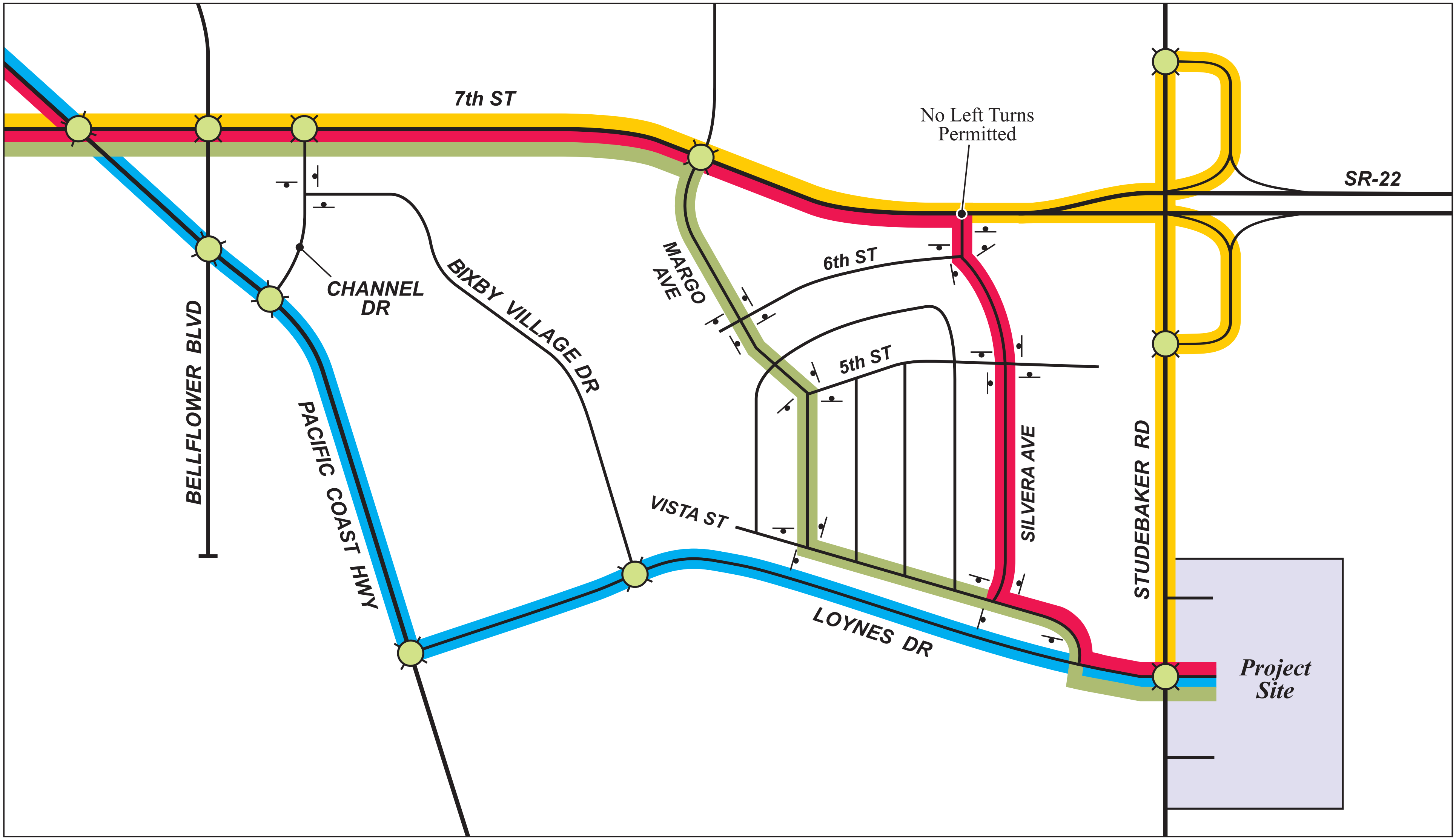
Project traffic destined eastbound via 7th Street would have two direct routes along major arterial roadways to the project site. Vehicles may access the project site along 7th Street via PCH and Loynes Drive, or via Studebaker Road to the project driveway at Loynes Drive.

Accessing the project site via 7th Street and Studebaker Road would provide a less conflicting route with fewer stop-controlled intersections, as well as higher speed limits along the major roadways. These major arterials are designed to accommodate heavy traffic flows and high speeds, as opposed to the limited capacity and stop-controlled intersections along the neighborhood (local) streets. Therefore, traffic destined to the proposed Long Beach Home Depot site would likely travel along the less conflicting routes at 7th Street or PCH to access the project site. It is anticipated that vehicles traveling along the University Park Estates streets would likely be the residents of the neighborhood destined to the project site.

Timed Route Surveys

Timed surveys were conducted in the University Park Estates neighborhood to determine whether the cut-through route via the University Park Estates is faster than driving along 7th Street or Loynes Drive. The surveys were conducted on March 12, 2005, March 14, 2005, and March 17, 2005, between the hours of 7:00 a.m. and 9:00 a.m. and 4:00 p.m. to 6:00 p.m. during the weekdays, and 11:00 a.m. and 1:00 p.m. on Saturday. The starting and ending points of the surveys were Studebaker Road/Loynes Drive (i.e., the proposed project access location) and PCH/7th Street. Two timed trials traveling in each direction were conducted on each day and averaged per peak hour. Appendix J shows the results of the three days of timed surveys. Table L summarizes the average of the timed route surveys during the weekdays and weekend.

As this table illustrates, the direct route via PCH and Loynes Drive provides the fastest travel time to the project site during the weekday peak hours. The direct route via 7th Street and Studebaker Road provides the longest travel time. During the weekday peak hours, the cut-through route via the University Park neighborhood is not as fast as the PCH/Loynes Drive route and only slightly better by a few seconds than the direct route via 7th Street and Studebaker Road. Therefore, there is no significant benefit in travel time between the cut-through routes and the arterial streets during the weekday peak hours.



LSA

FIGURE 16

Direct Travel Route via Major Arterials

- Route 1
- Route 2

"Cut-Through" Travel Route via Collector Arterials

- Route 3
- Route 4
- Traffic Signal
- Stop Sign

N

NO SCALE

Long Beach Home Depot

Traffic Routes

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Table L: Timed Route Surveys Summary

	Average Weekday A.M. Peak Hour	Average Weekday P.M Peak Hour	Average Weekend Midday Peak-Hour
Route 1: PCH/7th Street to Studebaker/Loynes (via PCH and Loynes Drive)			
PCH/7th Street to Studebaker/Loynes	5 min 26 sec	5 min 9 sec	3 min 3 sec
Studebaker/Loynes to PCH/7th Street	4 min 53 sec	4 min 26 sec	2 min 45 sec
Route 2: PCH/7th Street to Studebaker/Loynes (via 7th Street-SR-22 and Studebaker)			
PCH/7th Street to Studebaker/Loynes	5 min 43 sec	6 min 2 sec	3 min 54 sec
Studebaker/Loynes to PCH/7th Street	7 min 37 sec	8 min 3 sec	4 min 58 sec
Route 3: PCH/7th Street to Studebaker/Loynes (via 7th Street, Margo Avenue, Loynes Drive)			
PCH/7th Street to Studebaker/Loynes	5 min 11 sec	5 min 43 sec	5 min 1 sec
Studebaker/Loynes to PCH/7th Street	6 min 34 sec	6 min 55 sec	6 min 45 sec
Route 4: PCH/7th Street to Studebaker/Loynes (via 7th Street, Silvera Avenue, Loynes Drive)			
PCH/7th Street to Studebaker/Loynes	5 min 7 sec	5 min 20 sec	4 min 22 sec

During the weekend midday peak hour, the direct routes via PCH/Loynes Drive and Studebaker Road/7th Street provide faster travel times than the cut-through routes via University Park Estates. The arterial streets are approximately one to four minutes faster than using the cut-through route. This is due to less traffic along the arterial streets between the hours of 11:00 a.m. and 1:00 p.m. on the weekend than there is during the weekday peak hours. The highest trip generator for the proposed project is on the weekend, 952 weekend peak-hour trips, compared to 239 a.m. peak-hour trips and 422 p.m. peak-hour trips on weekdays. Therefore, when the project site is generating the most traffic, it is faster to use the arterial streets (i.e., 7th Street, Studebaker Road, Loynes Drive) than it is to use the neighborhood streets (i.e., Margo Avenue, Silveria Avenue).

RECOMMENDED IMPROVEMENTS/MITIGATION MEASURES

Based on the results of the traffic impact analysis, the proposed Home Depot Center would exceed the City's performance criteria at two study area intersections in the cumulative (project opening year) horizon. A weekend analysis was also conducted in the traffic impact analysis. Based on the results of the weekend analysis, three study area intersections in the weekend cumulative horizon would exceed the City's performance criteria. The study area intersection LOS worksheets with the recommended improvements are provided in Appendix J. As shown in the LOS worksheet, the following geometric improvements at the impacted study area intersections would improve the ICU and/or reduce the ICU to the baseline condition:

1. **Studebaker Road/State Route (SR-22) westbound ramps.** The proposed project would significantly impact this intersection during the weekday p.m. peak hour. Improvements to this location would require potential encroachment into the Los Cerritos Channel immediately adjacent and parallel to Studebaker Road. In addition, Caltrans has no plans to improve this facility. As such, there are no feasible improvements at this location that would mitigate the project's impact, and as a result, the project would create a significant unavoidable impact at this intersection.

2. **Studebaker Road/2nd Street.** The proposed project would significantly impact this intersection during the weekday p.m. peak hour and weekend midday peak hour. Converting the existing westbound right-turn lane into a through lane and constructing an exclusive westbound right-turn lane would mitigate the project's traffic impact at this intersection during both time periods. The recommended improvement would decrease the cumulative plus project Intersection Capacity Utilization (ICU) from 0.975 (LOS E) to 0.868 (LOS D) in the a.m. peak hour, 1.002 (LOS F) to 0.937 (LOS E) in the p.m. peak hour, and 0.980 (LOS E) to 0.933 (LOS E) in the weekend peak-hour.

   This improvement will require property acquisition from the adjacent property on the northeast corner of the intersection along 2nd Street. This intersection was identified as an impacted intersection in the Boeing Specific Plan Traffic Impact Analysis (December 2002). The report recommended the same improvements mentioned above with a fair-share contribution of approximately 85 percent for this improvement. To mitigate the impact at this intersection to a less than significant level, Home Depot would need to construct this improvement and be reimbursed for the Boeing project's fair-share commitment.

3. **Pacific Coast Highway(PCH)/7th Street.** The proposed project would significantly impact this intersection during the weekend midday peak hour. Due to right-of-way constraints along 7th

Street, there are no feasible improvements at this location that would mitigate the project's impact. Therefore, the proposed project would create a significant unavoidable impact at this location.

4. **PCH/2nd Street.** The proposed project would significantly impact this intersection during the weekend midday peak hour. Due to right-of-way constraints at this intersection, there are no feasible improvements that would mitigate the project's impact. Therefore, the proposed project would create a significant unavoidable impact at this location.

The project applicant has also agreed to construct other improvements that will enhance traffic flow and safety within the study area. The following project design features are proposed as part of the project. Since numbers 1–3 were incorporated into the modeling calculations for the proposed project, they are also included as required mitigation measures.

1. Provide one westbound left-turn lane, one westbound through-lane, and one westbound right-turn lane at the project driveway at the Studebaker Road/Loynes Drive intersection. In addition, a northbound right-turn lane and a southbound left-turn lane will be constructed. The inside eastbound right-turn lane will be converted to an eastbound through lane for vehicles entering the project site.
2. Change the traffic signal phasing for the northbound and southbound left-turn movements at Studebaker Road/Loynes Drive to protected-permissive turn movements.
3. Restripe northbound Studebaker Road (36 feet wide) between the south driveway and the SR-22 eastbound ramps to provide three (12-foot-wide) through lanes. The third northbound through lane will terminate at the northbound right-turn lane at the SR-22 eastbound ramps. Any encroachment into State right-of-way will require review and approval by Caltrans.
4. In conjunction with and upon approval by Caltrans and the City Public Works Director, install traffic signal interconnect along Studebaker Road from 2nd Street to the SR-22 westbound ramp signal. This will allow vehicles from 2nd Street to have progressive flow to the freeway on-ramp on Studebaker Road.
5. In conjunction with and upon approval by Caltrans and the City Public Works Director, develop and implement new traffic signal coordination timing for Studebaker Road for both weekday and weekend traffic conditions. This will provide signal coordination utilizing the new interconnect described above.
6. In conjunction with and upon approval by Caltrans and the City Public Works Director, develop and implement (with Caltrans) new traffic signal coordination timing along 2nd Street from Marina Drive to Studebaker Road using existing interconnect. This should reduce delay and queuing at PCH/2nd Street. Currently, there is no coordination between Caltrans-operated signals and City-operated signals.
7. In conjunction with and upon approval by Caltrans and the City Public Works Director, develop and implement (with Caltrans) new coordination timing along PCH between Studebaker Road and 7th Street for both weekday and weekend traffic conditions.
8. In conjunction with and upon approval by Caltrans and the City Public Works Director, design and construct pedestrian access across the Loynes Drive bridge west of Studebaker Road. This will provide convenient, accessible, (i.e., ADA) pedestrian access from the adjacent residential area to the proposed neighborhood shops and restaurants.

9. In conjunction with and upon approval by Caltrans and the City Public Works Director, design and stripe a bicycle lane on Loynes Drive from Studebaker Road to PCH, including new bicycle push buttons at PCH/Loynes Drive and Studebaker Road/Loynes Drive.

FAIR SHARE ANALYSIS

The project proponent is required to pay a "fair-share" of the improvement costs to mitigate cumulative impacts. The a.m. and p.m. peak-hour proportions of new traffic at the study area intersections impacted by the project (i.e., Studebaker Road/2nd Street) are shown in Table M. This table illustrates the peak-hour percentage of net project traffic for the impacted study area intersections. The project's "fair-share" percentage was determined based on the following equation:

$$\text{Project's Fair Share Percentage} = \frac{\text{Cumulative Plus Project Traffic - Cumulative Baseline Traffic}}{\text{Cumulative Plus Project Traffic - Existing Traffic}} \times 100$$

Table M: Project Fair Share Percentage Calculations

		(1)	(2)	(3)	(4)	(5)
Intersection	**Peak Hour**	**Existing Traffic**	**Cumulative (2006) Traffic**	**Cumulative (2006) plus Project Traffic**	**Net Project Increase**	**Project Fair-Share Percentage[1]**
Studebaker Rd/2nd Street	AM	3,362	4,005	4,064	59	13.66%
	PM	4,645	4,645	4,750	105	15.11%

Notes:
1 Project Fair-Share Percentage (5) = [Column (3) - Column (2)]/[Column (3) - Column (1)]

As shown in the table, the Home Depot project's fair share percentage is 15 percent at the intersection of Studebaker Road/2nd Street. The project should be responsible for this percentage of recommended improvements identified above; with the reimbursement of 85 percent from the Boeing project, this intersection improvement would be fully funded. Therefore, it is recommended that the Home Depot project construct this improvement and be reimbursed for the Boeing project's fair-share commitment.